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**DEVELOPMENT OF PHYSICAL PERFORMANCE
STANDARDS FOR ARMY JOBS:
THE JOB ANALYSIS METHODOLOGY**

David C. Myers, Deborah L. Gebhardt,
and Edwin A. Fleishman
Advanced Research Resources Organization

PERSONNEL UTILIZATION TECHNICAL AREA

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each strength and stamina factor and a procedures manual describing the steps necessary to establish physical ability requirements for additional MOS are published separately as ARI Research Products 80-5a and 80-5b. If the procedure proves valid, the Army can begin to use the methodology to establish physical ability requirements for all MOS on a judgmental rather than an empirical basis.

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FOREWORD

The Army Research Institute for the Behavioral and Social Sciences (ARI) conducts basic research in topical areas relevant to its exploratory and advanced development programs. This report describes basic research toward a methodology for identifying the physical ability requirements of Army jobs, using rating scales instead of more costly empirical methods. Two related documents were also produced by the research: ARI Research Products 80-5a and 80-5b, "Physical Performance Standards for Army Jobs: Criterion Task Manual" and "Physical Performance Standards for Army Jobs: Procedures Manual." The entire research, intended as a first step toward a gender-free assignment system, is responsive to the objectives of Army Product 20161102B74F, Basic Research in Behavioral Science, as they relate to the programs of ARI's Personnel Utilization Technical Area.


JOSEPH ZEIDNER
Technical Director

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DEVELOPMENT OF PHYSICAL PERFORMANCE STANDARDS FOR ARMY JOBS: THE JOB ANALYSIS METHODOLOGY

BRIEF

Requirement:

To determine if the physical requirements of Army Military Occupational Specialties (MOS) can be identified and described by rating-scale methods, as an alternative to costly and time-consuming empirical methods of observing soldiers actually performing their duties.

Procedure:

From a previously developed general technique, rating scales were adapted to assess eight dimensions of physical job demands: upper body static strength, lower body static strength, upper body dynamic strength, lower body dynamic strength, upper body explosive strength, lower body explosive strength, trunk strength, and stamina. Approximately 25 soldiers in each of the Army jobs of Infantryman (MOS 11B), Combat Engineer (MOS 12B), Armor Crewman (MOS 19E), and Military Police (MOS 95B), rated their duties on these scales. The ratings were combined to form a physical ability profile for each MOS.

Findings:

Statistical and logical analyses indicated that the scales provided consistent measures and identified the types of strength and stamina that would reasonably be expected.

Utilization of Findings:

The rating scale and procedures which were developed can provide reliable appraisals of the strength and stamina needed for Army jobs. Before they are used on a large or operational scale, however, they must be validated by controlled comparison of their results with the actual physical demands of specific jobs.

Two manuals, published separately, (a) list the most physically demanding tasks in each MOS and (b) describe the procedural steps in establishing physical ability requirements for additional MOS.

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INTRODUCTION

To meet recruitment goals the Army has been studying the expanded use of women in military occupational specialties formerly occupied only by men. The involvement of women in nontraditional Army jobs raises some critical questions especially where these jobs require either heavy manual work, prolonged exertion, or stamina. Women may have difficulty in performing physically demanding tasks in some specialties. It is, of course, true that some portion of the male population may also have difficulty in performing these tasks as well. Since the inability to perform well in such work does not apply to women only, and because some women are physically capable of performing heavy work, women as a group cannot be denied these jobs on the basis of their sex.

Such developments have increased the need for an analysis of physical performance standards required for Army jobs, and for ways of assessing these capacities in potential incumbents. The problem is a more general one. There is a need for assignment and performance appraisal methods that are objective and fair to various segments of the labor force. Some minority and ethnic groups have charged discrimination because of perceived arbitrary physical requirements for certain physically demanding jobs. Current Equal Employment Opportunity Commission guidelines have made it legally mandatory for employers to demonstrate by means of validation, that they are following procedures that insure such fairness in their personnel procedures. Furthermore, it is of particular importance to the Army to maintain unit effectiveness and efficiency. If incumbents are being assigned to specialties with physical and operational requirements that limit or preclude their effective and safe performance, better methods of assignment are needed. It is therefore desirable to have performance criteria that permit the evaluation of various assignment strategies based on the individual's physical capacity to perform that job, regardless of the soldier's sex.

To meet the Army's need for job related standards of performance the present effort was designed to (a) develop and evaluate a job analysis methodology for specifying the physical requirements of Army jobs, and (b) evaluate the feasibility of determining job-relevant criterion performance standards based on these requirements. It also represents an advancement in the state-of-the-art in job analysis and criterion development for physically demanding jobs, providing methods and information for a variety of personnel programs and policy affecting the Army's utilization of men and women. The methodology developed can be extended to the analysis of a wide-range of Army jobs and be used for the clustering of jobs in terms of common physical requirements, the development of job-relevant performance standards, and the identification of criterion measures of physical proficiency.

Physical Abilities Analysis

In an attempt to translate the characteristics of jobs into physical requirements, Fleishman (1976) developed Physical Abilities Analysis. This approach was based on his extensive research indicating that neither a general physical proficiency factor, nor a general strength factor exists in performing physical work (Fleishman, 1962, 1964; Fleishman, Kremer, & Shoup, 1961). These findings were obtained from research in which actual performance was observed on several hundred physical proficiency tasks. People who performed well on certain groups of tasks did not necessarily perform well on others. Correlations were computed among tasks and nine factors emerged, accounting for a significant portion of the variance on physical task performance.

Nine basic physical abilities that were found useful in describing hundreds of separate physical performances can be used to evaluate the physical abilities required in jobs, as well as providing a basis for selecting measures most diagnostic of the separate abilities. Of these nine physical ability factors five are important to the present study-- four indices of strength and one index of stamina. Although other abilities

such as flexibility and equilibrium have been implicated in terms of physical requirements, the major source of sex differences is in strength (Laubach, 1976). Consequently, the strength and stamina factors were the primary focus of the present research. Results of the research discussed above indicated that a single strength factor is a meaningless concept. Therefore this study focused on four separate strength factors.

The first of these is dynamic strength. This is defined as the ability to exert muscular force repeatedly or continuously over time. It represents muscular endurance and emphasizes the resistance of the muscles to fatigue. The common emphasis of tasks involving this ability is dependent upon the capacity of the muscles to propel, support, or move the body and/or objects repeatedly for prolonged periods of time.

The second factor, trunk strength, is a more limited dynamic strength factor--specific to the trunk muscles, particularly the muscles of the abdomen and lower back.

A third strength factor is static strength. In contrast to dynamic strength which involves continuous or repeated support of the body's own weight and/or objects for prolonged periods of time, static strength is the force that an individual can exert against external objects (such as in lifting heavy weights or pulling heavy equipment). It represents the maximum force that an individual can exert, for a brief period of time. However, resistance to fatigue is not involved as is the case with dynamic strength.

The fourth strength factor is explosive strength. This is the ability to expend a maximum of energy in one or a series of explosive acts. This ability is distinguished from the other strength factors in requiring effective mobilization of energy for bursts of effort, rather than continuous strain or exertion of muscles. For example, this ability is present in jumping tasks or running short distances at a high speed, such as the 100 yard dash. Explosive strength is the greatest amount of force that can be applied in a very short time period.

The final ability, stamina is the ability of the respiratory and circulatory systems to perform efficiently over prolonged time periods in relation to the workload. This ability is technically termed cardio-respiratory endurance and is limited by cardiac output, the ability of the heart to pump large quantities of blood in one stroke, and the oxygen carrying capacity of the blood.

The Physical Abilities Analysis technique was developed to assess the extent to which a job requires the different physical abilities. The technique involves the use of a Manual containing rating scales, one for each of the different physical abilities. For each ability there is a definition and a description that differentiates the ability from the other abilities. Accompanying each definition is a rating scale that includes examples of tasks representing different amounts of that ability. These examples represent a wide variety of tasks which are familiar to raters using the scale, so that special training is unnecessary to use the technique. For example, for the scale "static strength," the 7-point scale goes from "requires little force to move a light object" to "requires use of all the force possible to lift, push, or pull a very heavy object." The specific task anchors given on this 7-point scale range from "lift a package of bond paper" (level 1 on the scale) to "lift bags of cement into a truck" (which appears at level 6 on a 7-point scale). There are other examples to assist the rater. It is important to note that all scale values for task examples are determined empirically from previous research. In observing a new job, the rater looks at the tasks involved and places the job somewhere on the scale with respect to these definitions and examples given. He does this for each of the 9 scales covering the physical abilities described.

The procedure yields a quantitative profile of physical abilities judged to be required for performance in each job. This profile can be translated into the specific performance measures and standards that represent the abilities. The procedure meets many of the concerns

embraced by the Army's need to develop an objective, gender-free assignment system, and is defensible in terms of EEOC Guidelines for basing assignments on job-relevant information.

Previous Research Analyzing Physical Requirements

The Physical Abilities Analysis procedures have been applied in a number of local government agencies and industrial organizations. Analysis of the physical job requirements for the police officer job was conducted for the city of Philadelphia along with a content validation study of a preliminary battery of selection tests (Romashko, Hahn, & Brumback, 1976). Similarly in New York City, physical requirement analyses identified the physical demands of the firefighter, sanitation worker, and parking enforcement agent jobs and were used in developing tests for measuring and predicting performance (Romashko, Brumback, Fleishman, & Hahn, 1974). In the private sector, a number of industries have successfully employed Physical Abilities Analyses for specifying the requirements of several jobs (Zedeck, 1976; Jones & Prien, 1978). They have continued using this methodology particularly to evaluate physically demanding jobs that were previously designed only for men but have opened recently to women. Research using the physical abilities analysis has also been completed for some 2000 San Bernardino County, California jobs in an attempt to link objective physical job requirements to pre-employment medical standards (Hogan, Ogden, & Fleishman, 1978). More recently, the methodology has been used as a basis for developing job-related procedures used in pre-employment screening of applicants for apprenticeable jobs at the Exxon refineries (Hogan, et al., 1979), and for developing similar kinds of tests for order selector jobs (Hogan, Ogden, & Fleishman, 1979).

The methodology for assessing physical requirements and for developing physical standards has been shown to be practical in large scale administration and to possess acceptable psychometric characteristics. The data gathered to date, although not comparable across all investigations, are promising. On the question of rater agreement on ability dimensions, high interrater reliability was obtained using the rank

ordering of ability ratings provided by groups of incumbents and supervisors for the jobs of fireman, sanitation man, and parking enforcement agent (Romashko, Brumback, Fleishman, & Hahn, 1974). These rho values were .64, .69 and .69 ($p < .05$), respectively. In an analysis of the physical abilities of the policeman's job, the rank order correlation for pairs of supervisors and police officers was .66, ($p < .05$) across nine physical abilities (Romashko, Hahn, & Brumback, 1976). These reliabilities were confirmed in a study undertaken by Pacific Telephone and Telegraph in which Zedeck (1975), using a slightly different approach to job analysis, evaluated the craft positions of installer-repairman, splicer, and lineman with the Physical Abilities Analysis. The correlations of importance ratings between the foreman and the incumbents were .79, .87, and .68 ($p < .01$) for each respective craft position. It is also of interest to note that significant agreement was found between ratings by men and women on these jobs.

Reliability has also been assessed by replication. Zedeck (1975) reported high agreement between raters in San Diego and raters in Sacramento for the physical abilities of the installer-repairman ($r = .68$, $p < .01$), splicer ($r = .50$, $p < .01$), and lineman ($r = .50$, $p < .01$) jobs. Recently, personnel specialists in San Bernardino, California administered the Physical Abilities Analysis to incumbents in the fireman's job (Hogan, Ogden, & Fleishman, 1978). The physical abilities profile obtained paralleled closely the profile obtained for the New York firemen (Romashko, Brumback, Fleishman, & Hahn, 1974).

Taken together these results have two implications. First, various segments of the work force familiar with the specific job can agree reliably on the physical abilities necessary to perform the work. Second, this method of physical abilities analysis tends to be robust.

Data bearing on validity of the job analysis technique are available. For example, Theologus and Fleishman (1971) found high correlations between ratings of ability requirements in a wide variety of psychomotor

tasks and actual factor loadings of these tasks obtained in other independent studies. However, validation of these abilities concepts may involve physiological as well as performance measures. The research findings indicated substantial relationships between actual ft.-lbs. of work, metabolic costs of work, and ratings of physical effort (Hogan et al., 1979). Although research links between physical costs of work and methods for estimating physical requirements of jobs have only recently been investigated, completed research in physical strength provides promising results for support of the Physical Abilities Analysis strength factors.

A recent review of comparative muscular strength of men and women (Laubach, 1976) indicates observed differences in four component strength areas. In terms of upper extremity static strength measurements, women exhibited a range of 35 to 70 percent of the average man's strength. Women were found to range from 57 to 86 percent of men's lower extremity static strength measurements. Trunk strength for women ranged from 37 to 70 percent of men's, while dynamic strength fell between the range of 59 to 84 percent of strength indicators for men.

These results suggest that a single strength factor is not only inappropriate but can lead to erroneous conclusions. Women exhibit different ranges in strength abilities depending upon the category of strength required. Further, there is no "rule of thumb" percentage that could be used to indicate the relationship between women and men's strength. It appears that the concept "static strength" may not be sufficiently descriptive. A result of the Laubach (1976) review indicates that women's lower extremity static strength more closely approximates men's ($x = 71.9\%$) than does upper extremity static strength ($x = 55.8\%$). Although in past job analysis research, the upper versus lower extremity static strength distinction has not been made, it is clear that these data support that division. The implication for job analysis is that consideration be given to evaluating static strength as a double faceted component. This possibility, as well as other modifications of physical abilities analysis were examined in the present research endeavor.

In the present study the feasibility of using physical ability analysis for identifying physical requirements of Army jobs was explored. More specifically, the physical abilities analysis approach was adapted to the Army system in order to develop objective, job related standards of physical proficiency. The investigation focused on several issues: (1) availability of useful and efficient sources of task analysis information, (2) utility of separating strength factors into upper and lower body extremities, (3) determination of quantitative profiles of physical abilities judged by subject matter experts as required for performance of the job, and (4) the identification of criterion measures for assessing physical proficiency in each MOS.

METHOD

The procedure involved three operations. First, task analyses were conducted to identify the job content (i.e., tasks) of seven MOSs. Based on these analyses, task banks were developed and used as the basis for Physical Abilities Analysis. Second, scales were developed to obtain the judgments of incumbent personnel regarding the physical ability, criticality, and team work requirements of Army jobs. Third, incumbents representing the MOSs under investigation were assembled to complete the ratings of task criticality and team tasks, as well as the ratings for strength and stamina factors. Emerging from this analysis were indications of physical ability requirements, represented by a quantitative profile of criterion tasks for each MOS.

Task Analysis

The MOSs were selected for study on the basis of frequency of entry directly after basic training, the variety and extent of the physical demands, and the possibility of the MOS having a civilian counterpart. They also represented a wide range of Army jobs thereby maximizing the generality of the findings. Based on these standards, discussions with Army officials at ARI, and a review of existing Army job analysis sources (e.g., AR611-201) the following MOSs were selected for analysis:

- Infantryman (11B) - Leads, supervises and serves as a member of an infantry activity employing individual weapons and machine guns in offensive and defensive combat operations.
- Combat Engineer (12B) - commands, serves, or assists as a member of team, squad, section or platoon engaged in providing combat engineering support to combat forces (e.g., construction and demolition).

- Tank Crewman (19E) - Leads, supervises, or serves as member of M60A1/A3 armor units in offensive and defensive combat operations; primarily functional areas are ammunition loading, gunnery, maintenance, combat, and intelligence operations.
- Motor Transport Operator (64C) - Supervises or operates wheel vehicles to transport personnel and cargo.
- Storage Specialist (76V) - Supervises or performs receipt, storage, issue, segregation, care, preservation, inspection, packing and shipment of material other than ammunition and petroleum.
- Medical Specialist (91B) - Supervises dispensary of field medical facilities, administers emergency medical treatment to battle field casualties, assists with inpatient and outpatient care and treatment, and assists with technical and administrative management of medical treatment facilities.
- Military Police (95B) - Supervises or provides law enforcement activities, preserves military control, provides security, controls traffic, quells disturbances, protects property and personnel, handles prisoners of war, refugees, or evacuees and investigates incidents.

After selecting the seven MOSs an examination of the jobs was conducted to identify the duties and tasks performed by incumbent soldiers. Job analysis documents provided by ARI and MILPERCEN were reviewed to determine the tasks and personnel requirements of each of the seven MOSs. The major documents reviewed included the Dictionary of Occupational Titles (DOT), Soldier's Manuals, Skill Qualifications Tests (SQT) and Military Occupational Data Banks (MODB). The latter source of job analysis information proved to be a valuable and efficient source of task data. The MODB inventories contained an exhaustive list of task statements des-

cribing the work of each MOS. These task banks available for other MOSs were developed by the Military Occupational Development Division for conducting job analysis surveys aimed at determining the tasks performed by incumbent soldiers. Since the task banks were based on a relatively systematic and sophisticated developmental process, they were used as the primary source of task analysis information for the present study.

Because the MODB inventories contained at the minimum several hundred task statements many of which obviously did not require physical proficiency on the part of the soldier, we were able to eliminate a portion of the tasks. Thus, the task banks were reduced to a manageable size for subsequent use by subject matter experts. To accomplish this reduction, the original task banks for each MOS were reviewed by ARRO researchers and two ARI staff members familiar with the MOSs. Each task was classified into one of five categories describing the different levels of physical demands in work. This classification system was obtained from the job analysis methodology adopted by the Department of Labor's Training and Employment Service for determining physical demands of jobs, e.g., sedentary work to very heavy work, (see Appendix A). The tasks were also rated on a broad five-point scale of criticality (i.e., if task not performed adequately, it would result in failure to accomplish the mission and/or result in loss of life, limb, or damage/destruction of equipment). Tasks were eliminated when the ratings indicated low physical ability involvement and lacked evidence of criticality.

Even though the preliminary review of the original task inventories allowed us to cull out the less physically demanding and least critical tasks from the banks, the remaining tasks were still limited in several ways. Some of the tasks were too general and broad (e.g., prepare bivouac area, construct a Bailey Bridge, etc.), while other tasks had variable demands (e.g., changing tires on different sized vehicles). These conditions, in addition to some ambiguous task statements, created the need for further probing into the task content of the MOSs before the physical abilities analysis could be used to yield reliable, job-related physical ability requirements.

The more intensive investigation was based on a semi-structured interview focusing on the specific nature of physically demanding tasks for each of the seven MOSs. An interview instrument was constructed for each MOS containing the tasks identified during the preliminary review of the task banks, which possibly involved physical demands (see Appendix B). A member of the research team interviewed two to three subject matter experts (SMEs) for each MOS.¹ The meetings focused on clarifying the task banks in terms of physical demands, specificity, comprehensiveness and criticality. Discussions with SMEs, observations of work, and review of training documents produced more complete and comprehensive task analysis data and, thereby, provided adequate task information for conducting the physical abilities analysis. The final task banks for the seven MOSs are presented in Appendix C.

Development of Scales

Physical abilities scales. Since an important objective of the present study was to evaluate the feasibility, practicality, and meaningfulness of expanding the strength factors (i.e., static, dynamic, and explosive) into upper and lower body extremities, and because the task analysis yielded a number of tasks focusing on either upper or lower body strength, the three original strength scales were expanded into six rating scale instruments. Six revised definitions were developed to explain the nature of the strength abilities (i.e., upper body static strength, lower body static strength, upper body dynamic strength, lower body dynamic strength, upper body explosive strength, and lower body explosive strength). Since the revisions dealt with only minor changes in the involvement of certain muscle groups, the basic underlying nature of the definitions remained the same. That is, for both upper and lower extremities static strength scales still involved the use of muscle force to lift, push, or pull objects, dynamic strength involved the ability to support, hold up, or move the body's own weight and/or objects, and explosive strength was the ability to use short bursts of muscle force to propel one's self

¹ The interviews were with the following types of soldiers: Infantryman-SGT, MSG, and SFC at MILPERCEN; Combat Engineer-SM and CSM at Ft. Belvoir; and at Aberdeen Proving Grounds Tank Crewman-SGT and SFC; Motor Transport Operator-PFC and SGT; Supply Specialist-two SGTS; Medical Specialist-two Spec.5; Military Police-two SGTS.

or objects. The only difference between the definitions of the upper and lower body strength factors was the muscle groups involved (i.e., upper body strength uses muscles located in the hands, arms, upper back and shoulders, while lower body strength uses muscles located in feet and legs)..

Next, new anchors representing the different levels of ability, were developed for each of the six upper and lower body strength factors. The research team generated approximately 30 tasks representing each of the six factors. Twenty college students from the University of Maryland provided independent ratings based on the degree to which they believed each of the strength factors were required to perform the tasks. The results of their ratings are illustrated in Appendix D. Tasks were chosen as anchors based on their relevancy to a specific ability as well as the quality of their psychometric properties. Anchors were selected for each of the six strength scales representing the three levels of ability--high (7.00 to 5.00), moderate (4.99 to 3.00), and low (2.99 to 1.00). For each scale, potential anchors were ranked within the three categories according to their standard deviation (i.e., reliability of the mean rating). A task with a low standard deviation was selected as the anchor at each level of the scale (i.e., three anchors for each scale). Final scales are presented in Appendix E.

The final physical abilities analysis instrument included the six upper and lower body strength scales, and scales measuring job/task requirements in terms of trunk strength, stamina, and effort (see Appendix E). These seven point scales also have empirically derived anchors, and have been shown in previous studies to yield reliable ratings of job requirements (Hogan, et al., 1978). The effort scale was used to provide some evidence of construct validity for the newly developed strength scales, because of the empirical "link" shown between effort and actual physiological costs of work (Hogan & Fleishman, 1979).

Measures of criticality. To meet the objective of providing job-related physical ability requirements of Army jobs, it was necessary

to identify tasks judged by incumbents as important to overall job/mission success. These critical tasks provided a basis for inferring the physical ability requirements of Army jobs.

As part of the Army's occupational analysis program, efforts have been made to identify and define the dimensions of criticality as well as develop instruments to assess these dimensions. The Army's Training and Doctrine Command produced a circulation (351-4; 10 July 1978) describing the various facets of completing a job/task analysis of Army jobs. Although the document focuses on task analysis, the ultimate purpose of the analysis is to provide a foundation for the development of training systems (ISD model). Because of the emphasis on developing job-related training systems, TRADOC has designed instruments to assess the dimensions of criticality--probability of emergency performance/task delay tolerance; task learning difficulty; and consequences of inadequate performance. Gilbert et al. (1978) explored the feasibility of a strategy for assigning training priorities for different Army MOSs (i.e., storage specialist). They found that the scales measuring three different facets of criticality were associated with training priorities. They also reported low to moderate correlations between the three scales indicating some degree of independence between the dimensions of criticality. The apparent utility of the scales suggested their use in the present study; however, minor revisions were first made in the definitions and the anchors on the seven point scales (see Appendix E).

Measurement of individual versus team tasks. During the preliminary planning of the study, it became apparent that the nature of the soldier's work group may affect the physical requirements of the job. In other words, the degree of physical demands of a task may vary as a function of interrelationships between the soldier and his/her co-workers. For example, the task of obtaining a 60 lb. tool box from a 12 foot high shelf by using a ladder could require different physical abilities depending on the assistance a soldier obtains from other members of his/her work group (i.e., two persons carrying a ladder will be less demanding than for one person).

Because the physical requirements of tasks may vary with the characteristics of the members of the team and with the nature of the team's relationship with the soldier responsible for performing the task, an attempt was made to identify team tasks and individual tasks. The determination of tasks performed by individual soldiers rather than by teams may provide a stronger basis for establishing physical performance standards. One can be more confident that the performance standards based on individual tasks are less likely to change as the nature of the work group changes. It identifies and controls for an important source of variation in performance standards.

Based on this rationale, a scale was designed to identify team tasks defined as two or more persons contributing to the successful completion of a task (see Appendix E). A seven point scale represented the percentage of the time that the task was performed by a team during the past year (e.g., never performed as a team to always performed as a team).

Physical abilities analysis. To obtain ratings of physical demands, criticality, and team work from subject matter experts representing the seven MOSs under investigation a Physical Abilities Analysis Manual (PAAM) was developed for each MOS. The manuals contained a brief introduction to physical abilities analysis (e.g., rating process, purpose of ratings, etc.), a section for providing biographical information (e.g., age, sex, grade, tenure in MOS, etc.), and a section for SMEs to record their ratings of physical demands, criticality, and team work (see Appendix F for Physical Abilities Analysis Manual). This last section of the manual was separated into two parts. The first part dealt with providing ratings for the 13 scales (i.e., strength, stamina, effort, criticality, and team work) in terms of the overall job requirements without task data, while the second part contained the same 13 rating scales focusing on task requirements for each MOS (i.e., the previously developed task banks).

The PAAMs were administered to SMEs representing four different MOSs. ²

² Incumbent personnel were not available during the present contract period for the MOSs--Motor Transport Operator (64C), Storage Specialist (76V) and Medical Specialist (91B).

A description of the participants' background characteristics for each MOS are presented in Table 1. The participants (SMEs) were selected based on their training and experience in a particular MOS and, therefore, were able to provide expert ratings regarding the physical demands, task criticality, and team work. Once participants in each MOS were assembled as a group, the administrator read aloud the introduction and instructions; the participants followed along. Each group proceeded through the manual by reading the ability definitions, reviewing the scales, and rating the overall job in Part I and the specific tasks in Part II. The administrator provided examples and illustrations to clarify the meaning of the different abilities and distinctions between the scales. The process took approximately two to three hours depending on the size of the task bank.

Table 1
Selected Frequencies and Means of the Demographic Data for All MOSs

MOS (#)	Mean Age	SEX		RACE						GRADE LEVEL								SKILL LEVEL					Mean Years In Present MOSs	Mean Years In Army
		Male	Female	White	Black	Oriental	MO*	E4	E5	E6	E7	E8	MO*	1	2	3	4	5	MO*					
Infantryman (11B)	25.1	26	0	19	6	1	0	1	18	5	1	0	1	0	10	14	1	0	1	4.69	5.46			
Combat Engineer (12B)	26.0	22	0	14	8	0	0	1	19	1	1	0	0					22	5.67	6.40				
Tank Crewman (19E)	28.7	25	0	17	6	0	2	0	11	10	1	1	2	0	5	9	4	1	0	4.26	6.87			
Military Police (95B)	31.2	25	2	24	3	0	0	0	9	14	2	2	0	0	6	15	4	2	0	9.67	11.52			

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* Missing data

RESULTS

The data consisted of ratings on eight physical ability measures, three criticality measures, and separate measures of effort and team work taken from four MOSs; Infantryman (11B), Combat Engineer (12B), Tank Crewman (19E), and Military Police (95B). These results are presented under the following headings: (1) descriptive statistics, (2) interrater reliability, (3) independence of strength measures, (4) determination of physically demanding tasks and task criticality, (5) comparison among categories of ratings, and (6) comparisons between MOSs using most physically demanding tasks and overall job ratings.

Descriptive Statistics

Descriptive statistics calculated on the ratings of each task for all four MOSs are found in Appendix G. This appendix consists of the means and standard deviations for the 13 scales. The 13 scales were titled: upper body static strength (UBSS), lower body static strength (LBSS), upper body dynamic strength (UBDS), lower body dynamic strength (LBDS), upper body explosive strength (UBES), lower body explosive strength (LBES), trunk strength (TS), stamina (S), effort (EF), consequences of inadequate performance (CIP), delay tolerance (DT), learning difficulty (LD) and team work (TW). The means for the overall job rating on each of the 13 scales and the mean ratings across tasks within each of the eight physical abilities (UBSS, LBSS, UBDS, LBDS, UBES, LBES, TS, and S) are also contained in Appendix G. A summary of these mean ratings across the physical abilities is presented in Table 2.

Mean task ratings for the Infantryman (11B) ranged from 2.4 to 6.4 on the eight physical abilities with the standard deviations ranging from 0.9 to 2.0. For the Combat Engineers (12B), the mean range was 2.2 to 6.1 and the standard deviation range was 0.8 to 2.2. The mean range for the Tank Crewman (19E) basically spanned the scale's seven point range from 1.5 to 6.7 with a standard deviation range from 0.6 to 2.1. Finally, the Military Police's (95B) means ranged

Table 2
Mean of Rating Across Tasks for Each Ability

Ability	Infantryman (11B)		Combat Engineer (12B)		Tank Crewman (19E)		Military Police (95B)	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Upper Body Static Strength	4.68	0.62	4.74	0.74	4.34	0.96	4.49	0.82
Lower Body Static Strength	4.14	0.71	3.94	1.05	3.64	0.86	4.06	0.79
Upper Body Dynamic Strength	4.49	0.74	4.66	1.10	4.04	1.08	4.39	0.86
Lower Body Dynamic Strength	4.08	0.93	4.10	1.11	3.37	1.08	4.38	0.81
Upper Body Explosive Strength	4.23	0.88	4.31	1.57	3.83	1.06	4.06	0.81
Lower Body Explosive Strength	4.04	0.82	4.00	1.54	3.32	1.14	3.80	0.78
Trunk Strength	4.28	0.69	4.05	0.75	3.74	0.99	3.70	0.93
Stamina	4.52	0.98	4.83	1.17	3.66	0.96	3.82	0.72

from 2.0 to 5.9 with the standard deviation ranging from 0.8 to 1.7. The mean ratings for all MOSs tended to range from 2.0 to 6.0 due to the a priori selection of tasks within each MOS that appeared to be physically demanding. This a priori task selection formed a restricted range which caused the majority of the mean ratings to be above the midpoint of the scale, 4.0, as reflected in Table 2.

In addition to the individual task ratings, all participants within each MOS rated the overall job on each of the 13 scales. These overall job ratings for each MOS are summarized in Table 3. These mean overall job ratings range from 4.1 to 6.2 which is well above the scale median of 3.5.

Interrater Reliability

For each MOS, intraclass correlations for the 13 scales were computed to determine the interrater reliability (Winer, 1971). These interrater reliability coefficients for each MOS across all scales are presented in Table 4. The reliability coefficient for Infantryman, Combat Engineer, and Tank Crewman ranged from 0.84 to 0.99, while the Military Police ranged from 0.70 to 0.95. These results indicated that there was high intersubject agreement on the ordering of the tasks on the 13 scales for each MOS.

Independence of Strength Measures

A secondary purpose of this study was to determine if incumbents were able to delineate the differences in upper and lower body strength when evaluating tasks within their jobs. A correlation matrix of all 13 scales for the four MOSs under investigation is presented in Appendix H. These correlations were low to moderate but significant. For example, the correlation between upper body dynamic strength and lower body dynamic strength was 0.33. The correlations for the other two strength measures, upper and lower static strength and upper and lower explosive strength, were 0.59 and 0.41, respectively. These relatively low correlations indicated that the incumbents were able to differentiate between the use of the upper and lower body musculature when rating specified tasks. Further, the majority of the correlations among the eight abilities were also low.

Table 3
Overall Job Ratings on Physical Abilities for Each MOS

Ability	Infantryman (11B)		Combat Engineer (12B)		Tank Crewman (19E)		Military Police (95B)	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Upper Body Static Strength	5.4	0.7	5.6	0.7	6.2	0.6	4.4	1.2
Lower Body Static Strength	5.3	1.1	5.1	1.2	5.7	1.0	4.1	1.3
Upper Body Dynamic Strength	5.4	1.2	5.6	1.0	6.2	0.8	4.2	1.1
Lower Body Dynamic Strength	5.3	1.3	5.3	0.9	4.8	0.8	4.6	0.9
Upper Body Explosive Strength	4.8	0.8	5.2	1.2	5.8	0.9	5.2	1.2
Lower Body Explosive Strength	5.2	1.1	5.2	1.4	4.8	0.9	5.2	1.4
Trunk Strength	5.6	1.0	5.4	0.9	5.0	1.0	4.6	0.9
Stamina	5.9	0.8	6.0	0.9	5.0	1.1	4.8	0.9

Table 4

Intraclass Correlations of Interrater Agreement for the 13 Scales

Job	Scales												
	UBSS ^a	LBSS	UBDS	LBDS	UBES	LBES	TS	S	E	CIP	DT	LD	TW
Infantrymen	0.90	0.89	0.92	0.96	0.95	0.94	0.92	0.95	0.94	0.97	0.95	0.98	0.95
Combat Engineer	0.95	0.86	0.99	0.98	0.99	0.99	0.98	0.97	0.98	0.98	0.99	0.99	0.97
Tank Crewmen	0.91	0.91	0.90	0.97	0.94	0.94	0.86	0.84	0.85	0.90	0.91	0.97	0.85
Military Police	0.89	0.85	0.92	0.90	0.93	0.70	0.83	0.89	0.89	0.94	0.93	0.95	0.95
UBSS ^a	Upper body static strength						S	Stamina					
LBSS	Lower body static strength						E	Effort					
UBDS	Upper body dynamic strength						CIP	Consequence of inadequate performance					
LBDS	Lower body dynamic strength						DT	Delay tolerance					
UBES	Upper body explosive strength						LD	Learning difficulty					
LBES	Lower body explosive strength						TW	Team work					
TS	Trunk strength												

Determination of Physically Demanding Tasks and Task Criticality

A statistical decision model was used to identify the tasks with high physical demands within the framework of each MOS and determine if that task was deemed critical. It is important to emphasize that the decision model used here is flexible and the decision rules were arbitrarily set to reduce the number of tasks to a more manageable size for presentation of the results. It is possible that during the next phase of the research a more lenient rule may be desirable in order to bring more of the physically demanding tasks into the validation. First, the identification of physically demanding tasks within an MOS involved the determination of a statistical cutoff point for each of the eight physical abilities (UBSS, LBSS, UBDS, LBDS, UBES, LBES, TS, and S).

Second, the criticality of each physically demanding task was determined using consequences of inadequate performance (CIP), delay tolerance (DT), and learning difficulty (LD). The task analysis was oriented towards obtaining physically demanding tasks as well as those tasks considered critical; consequently a majority of the tasks were rated at least a 3.0 on the criticality scales. Since the primary focus of the research was to determine the physical demands of Army MOSs, a more liberal cutoff point was set for criticality (4.0). At this stage of the research, the interest was on investigating the physical demands of work and not concerned so much with varying degrees of criticality.

The decision model generated a two-step statistical decision rule. First, all tasks that exceeded the statistical cutoff point on the physical abilities scales were retained. Tasks not exceeding the cutoff point for a particular physical ability (e.g., UBSS) were deleted from that ability within the specified MOS. However, if that task exceeded the cutoff point on another physical ability scale (e.g., UBDS) it was retained. Only tasks exceeding the cutoff point on one or more of the physical ability scales were retained; all others were deleted temporarily. Second, those tasks retained in the first step were evaluated on their mean criticality rating. If the mean criticality

rating equalled or exceeded 4.0, the task was retained for future development and validation. If the task did not equal or exceed the criticality cutoff, it was eliminated. This model is presented in Figure 1.

The scale cutoff points for the first part of the decision model were empirically derived from the physical ability ratings. The grand mean (GM) and standard deviation (SD) for each ability within each MOS were computed. The cutoff point for each ability in a MOS was calculated from:

$$\text{MOS Ability Cutoff} = \text{GM} + \text{SD}$$

where GM is the grand mean across tasks within an ability for a specified MOS and SD is the standard deviation associated with that grand mean. This decision rule was used to reduce the number of tasks and thus provide a more conservative estimate of the physically demanding tasks for each ability. This cutoff point is unique for each physical ability in each MOS (i.e., 11B, 12B, 19E, 95B). As stated above, the mean of the three criticality measures for each task within a MOS was calculated. If this mean equalled or exceeded the generalized criterion of 4.0 for criticality, the second part of the decision model was satisfied.

The results of this decision model for Infantryman (11B), Combat Engineer (12B), Tank Crewman (19E), and Military Police (95B) are presented in Figures 2, 3, 4, and 5, respectively. The majority of the tasks listed for upper and lower body static and dynamic strength (UBSS, LBSS, UBDS, LBDS) exceeded 5.3 in all four MOSs with the individual task means ranging from 4.7 to 6.7. Infantryman, Tank Crewman, and Military Police displayed similar upper and lower body explosive strength (UBES, LBES) characteristics with majority of the means ranging from 4.6 to 5.4. An exception existed for the Tank Crewman in UBES with a mean of 5.7. Although no Combat Engineer tasks met the cutoff point in the first step of the decision model for UBES and LBES, the highest rated tasks did conform to the second step of the model and were selected. This approach was adopted due to the large standard deviations (1.6 and 1.5) in the explosive strength measures for Combat Engineers.

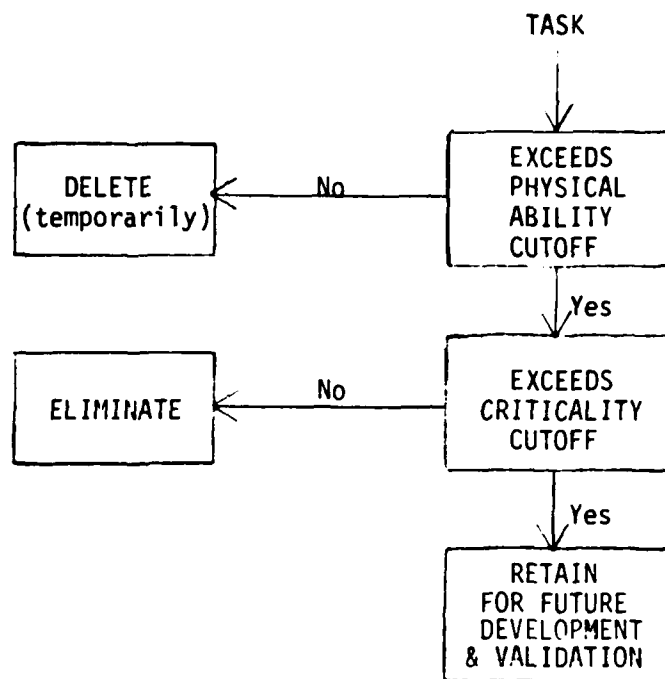


Figure 1. Statistical decision model for identifying the critical and physically demanding tasks.

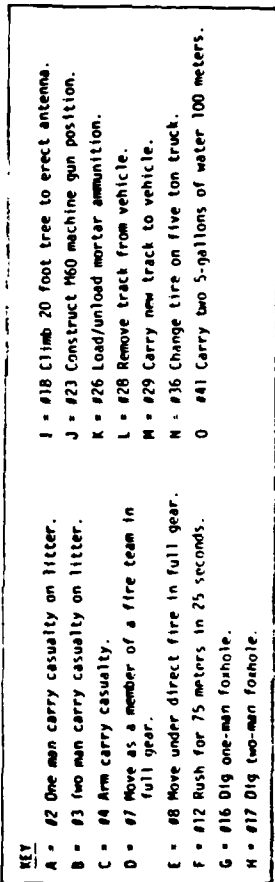


Figure 2. Physically demanding tasks ranked on ability for infantryman.

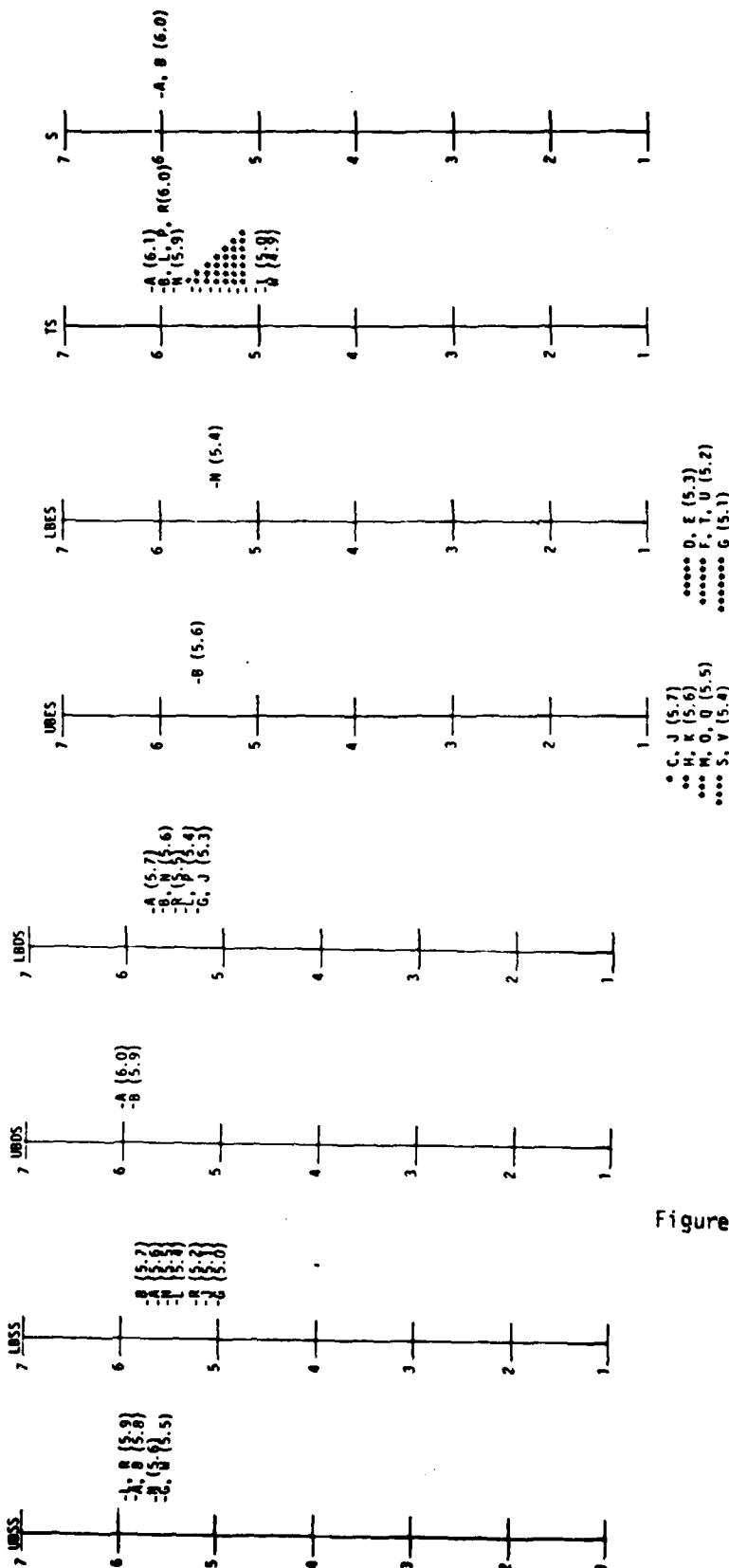
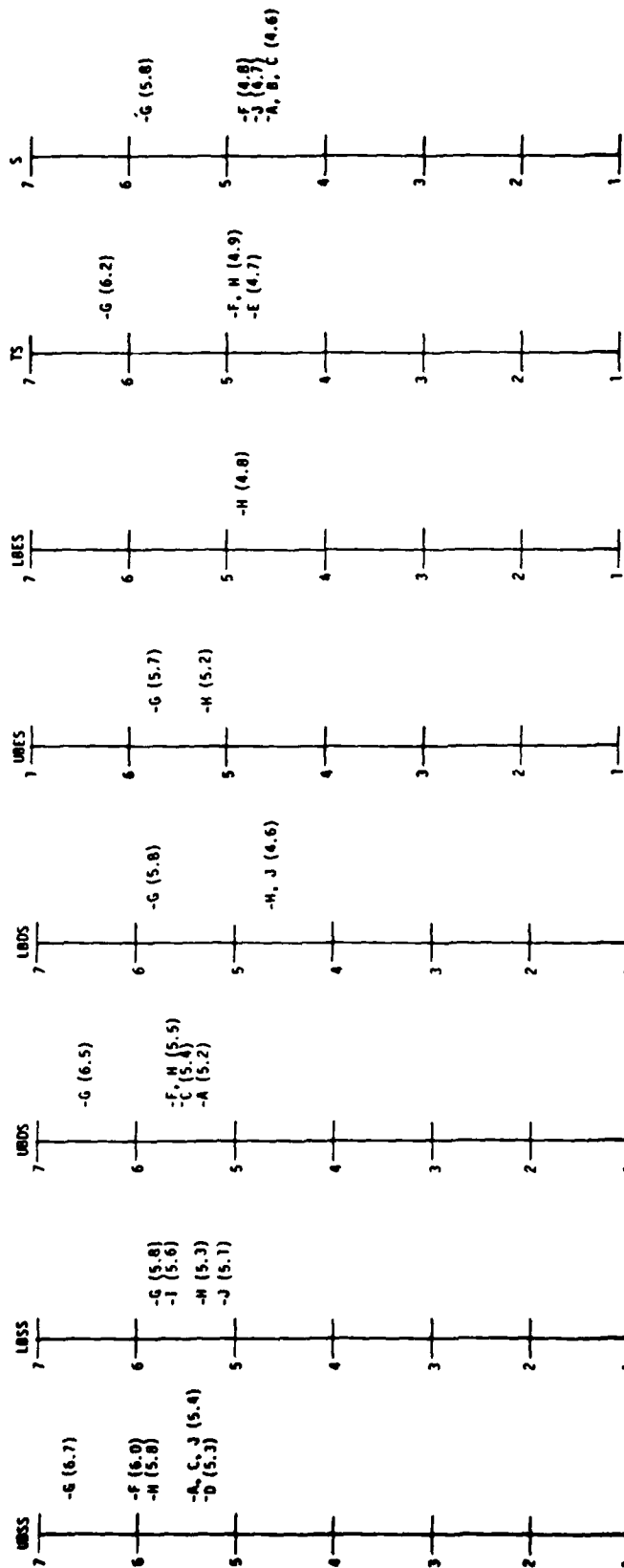


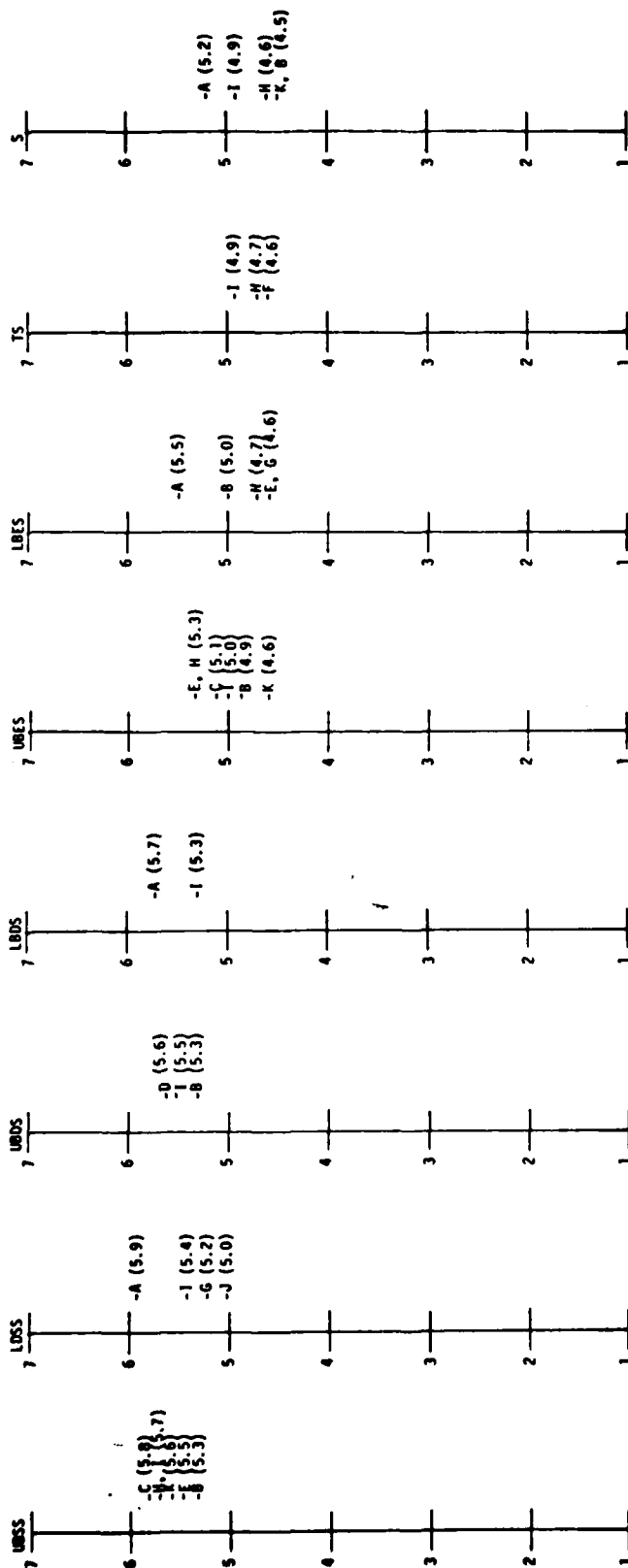
Figure 3: Physically demanding tasks ranked on ability for combat engineer.



KEY

- A = #2 Unload main gun ammunition from vehicle.
- B = #3 Remove ammunition from containers.
- C = #4 Pass ammunition from ground to turret.
- D = #5 Remove round from ammo well and load main gun.
- E = #6 Unload misfired main gun.
- F = #10 Remove armored/track vehicle tracks.
- G = #11 Carry new track to vehicle.
- H = #18 Pull unconscious crew member out of burning tank.
- I = #19 Escape from overturned armored vehicle.
- J = #26 One man carry casualty on litter.

Figure 4: Physically demanding tasks ranked on ability for tank crewman.



KEY

- A = #1 Run 1.6 kilometers to apprehend criminal.
- B = #2 Climb over a six foot wall.
- C = #4 Control uncooperative subject using hand to hand combat.
- D = #5 Control uncooperative subject using night stick.
- E = #6 Pull two men apart during a fight.
- F = #7 Evaluating injured/deceased person at an accident.
- G = #9 Climb fire escape five stories to roof.
- H = #15 Apprehend violators using hand to hand combat.
- I = #20 One man carry casualties with litter.
- J = #22 Move over, through, and around barbed wire.
- K = #28 Load/unload supplies and ammo from vehicle.

Figure 5: Physically demanding tasks ranked on ability for military police.

The individual task means for trunk strength centered around 5.4 for the Infantryman, Combat Engineer, and Tank Crewman. However, the Military Police means for trunk strength were found to range from 4.6 to 4.9. The stamina measure followed a similar pattern with the individual task means ranging from 5.7 to 6.0 for the Infantryman and Combat Engineer, with the majority of the means for Tank Crewman and Military Police ranging from 4.5 to 5.2.

The highest physically demanding tasks are summarized in Table 5. It should be noted that when the highest individual task mean for an ability in an MOS was shared by two tasks, the task with the smaller standard deviation was chosen to represent the ability. The means ranged from 5.3 to 6.7 with the exception of 4.8 for Tank Crewman in LBES. These results for the eight physical abilities tend to indicate that all four MOSs have several physically demanding tasks that are critical to the job.

Comparisons Among Three Categories of Ratings

It was of interest within the confines of this study to compare three categories of ratings on the physical abilities for each MOS. These categories were: (1) the grand mean across all tasks within each ability (GM); (2) the mean of the overall job rating of each ability (OJ), and (3) the mean of the highest rated task within each ability (HP). The results of these three categories are summarized for the four MOSs in Tables 2, 3, and 5.

The category means (GM, OJ, HP) across the abilities, that is the average ability mean for each category within an MOS, were tested for significant differences using paired t tests. This statistical procedure was used to test for differences between the means of (1) the grand mean across all tasks within an ability (GM) and the overall job rating (OJ), and (2) the overall job rating (OJ) and the highest rated physically demanding tasks (HP). A level of significance of .01 was set to control for type one error inflation.

Table 5

Highest Rated Physically Demanding Task for Each MOS

Ability	Infantryman (11B)			Combat Engineer (12B)			Tank Crewman (19E)			Military Police (95B)		
	Task No.	Mean	Standard Deviation	Task No.	Mean	Standard Deviation	Task No.	Mean	Standard Deviation	Task No.	Mean	Standard Deviation
Upper Body Static Strength	2	6.4	1.1	47F ^a	5.9 ^a	1.0	11	6.7	0.6	4	5.8	1.0
Lower Body Static Strength	2	5.8	1.4	46B	5.7	1.1	11	5.8	1.4	1	5.9	1.2
Upper Body Dynamic Strength	29	5.9	1.1	46A	6.0	1.2	11	6.5	0.8	5	5.6	1.4
Lower Body Dynamic Strength	29	5.4	1.6	46A	5.7	1.0	11	5.8	1.3	1	5.7	1.3
Upper Body Explosive Strength	29	5.3	1.5	46B ^b	5.6 ^b	1.6	11	5.7	1.6	6 ^a	5.3 ^a	1.0
Lower Body Explosive Strength	4	5.4	1.4	48A ^b	5.4 ^b	2.0	18	4.8	1.7	1	5.5	1.6
Trunk Strength	29 ^a	5.5	1.2	46A	6.1	1.1	11	6.2	1.0	20	4.9	1.5
Stamina	4	6.0	1.3	46B ^a	6.0 ^a	1.5	11	5.8	1.3	1	5.2	1.1

^a When two tasks had the same mean, the task with the lower standard deviation was ranked first.

^b Selected as highest mean but did not meet cutoff point in step one of the decision model.

A graphic illustration for Infantryman (11B) of the three categories, GM, OJ, and HP, is presented in Figure 6. Although the overall profile for the HP and OJ variables is similar, a t test of means across the abilities in this graph revealed a significant difference ($p < .05$) in the average ability means. Similarly, there was a significant difference ($p < .01$) between GM and OJ. Table 6 presents the paired variables, mean of the ratings, and t values for Infantryman.

Similar mean comparisons for Combat Engineer (12B) resulted in significant differences at the .01 level for comparisons between GM and OJ, and OJ and HP (Table 7). Figure 7 shows a similar pattern across the ability means for all three categories.

The Tank Crewman (19E) displayed a similar profile across abilities for OJ and HP. This is illustrated in Figure 8 and further substantiated by the lack of significance between the variables (Table 8). However, there was a significant difference ($p < .01$) between GM and OJ.

Although the GM and OJ profiles for Military Police (95B) were initially similar for the first four abilities, UBSS, LBSS, UBDS, and LBDS, these profiles diverged and resulted in similar profiles for OJ and HP for the latter four abilities, UBES, LBES, TS, and S (Figure 9). This divergence in the latter four scales resulted in a significant difference at the .05 level (Table 9). A significant difference ($p < .05$) was also found between OJ and HP.

The order of the average mean ability for each type of rating was identical for all MOSs (11B, 12B, 19E, 95B). The largest mean was HP, followed by OJ, with the smallest being GM. However, in several instances the means for OJ and HP differed only by 0.3. In these instances it appears that the practical difference between the categories is not significant. Also, it is important to note that the profiles for HP more closely approximated the profiles for OJ than did the GM profiles. They seemed to follow the same pattern of requirements.

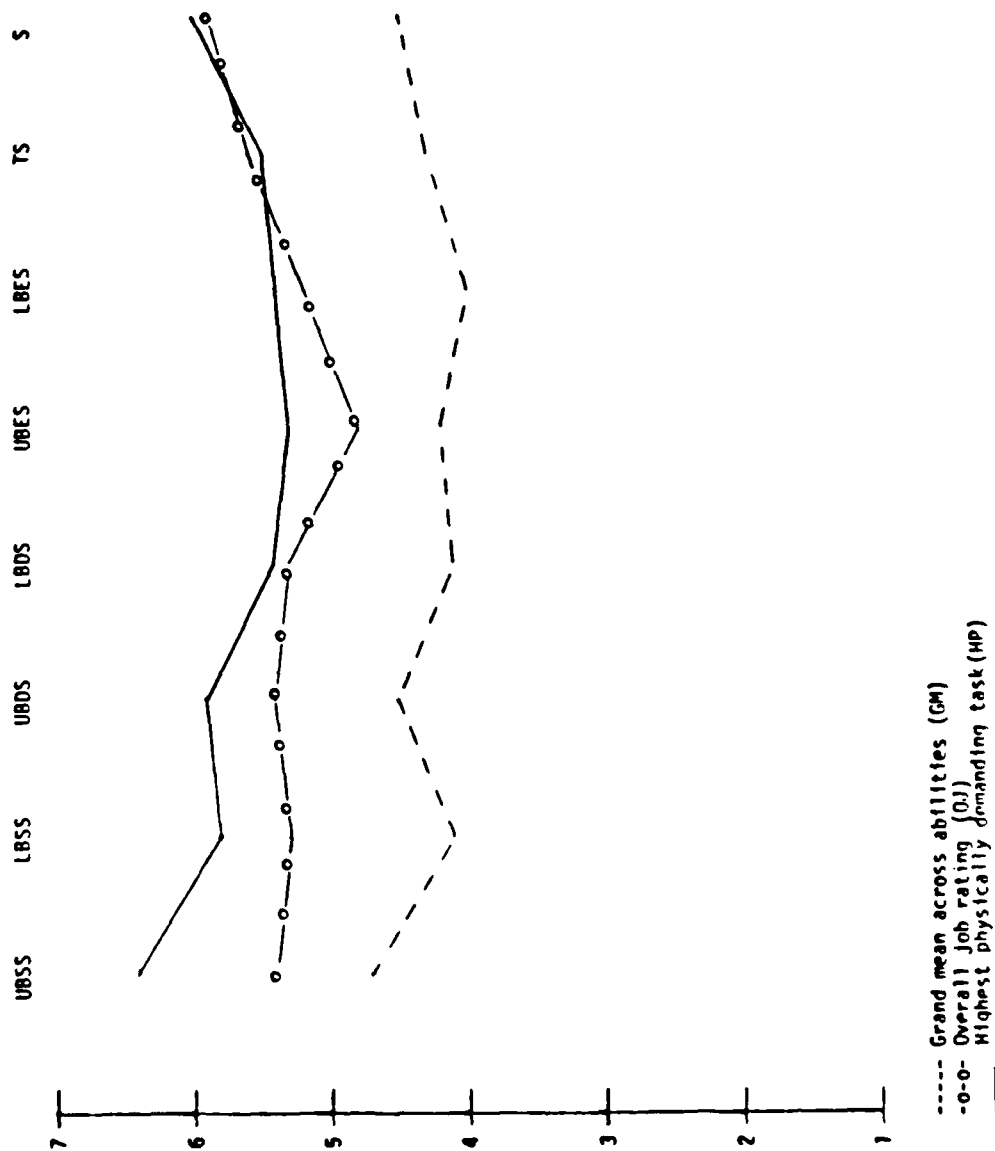


Figure 6. Comparison of three types of ratings for infantryman.

Table 6
Differences on Three Types of Ratings for Infantryman

Variable	Mean	Standard Deviation	df	t value	P<
GM ¹	4.30	0.25	7	-10.28	.0001
OJ ²	5.36	0.32			
OJ	5.36	0.32	7	- 3.10	.017
HP ³	5.69	0.33			

¹ Grand mean across abilities for mean of each ability across tasks.

² Grand mean of overall job ratings across abilities.

³ Grand mean of highest physically demanding tasks across abilities.

Table 7
Differences on Three Types of Ratings for Combat Engineer

Variable	Mean	Standard Deviation	df	t value	P<
GM ¹	4.33	0.36	7	-18.41	.0001
OJ ²	5.43	0.30			
OJ	5.43	0.30	7	- 4.85	.002
HP ³	5.80	0.24			

¹ Grand mean across abilities for mean of each ability across tasks.

² Grand mean of overall job ratings across abilities.

³ Grand mean of highest physically demanding tasks across abilities.

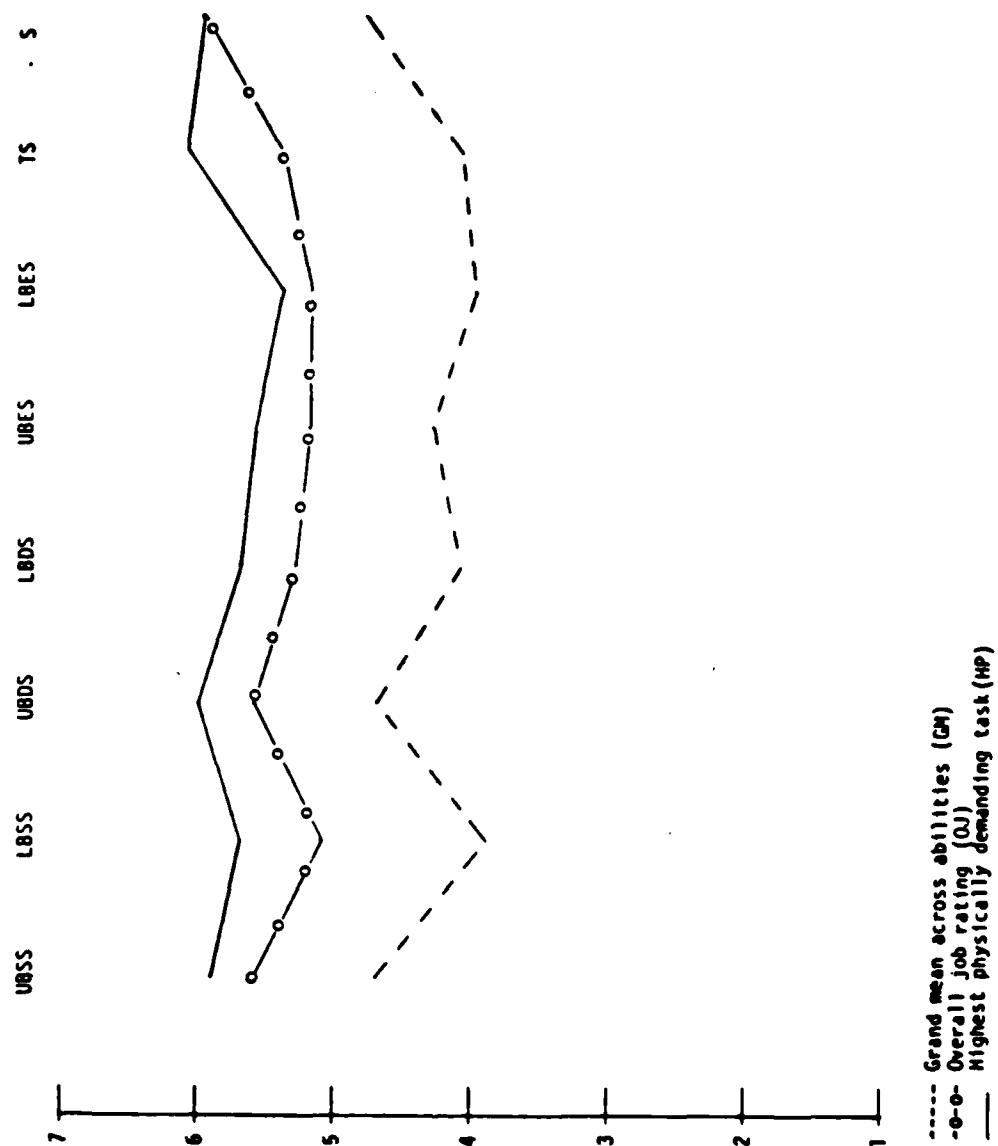


Figure 7. Comparison of three types of ratings for combat engineer.

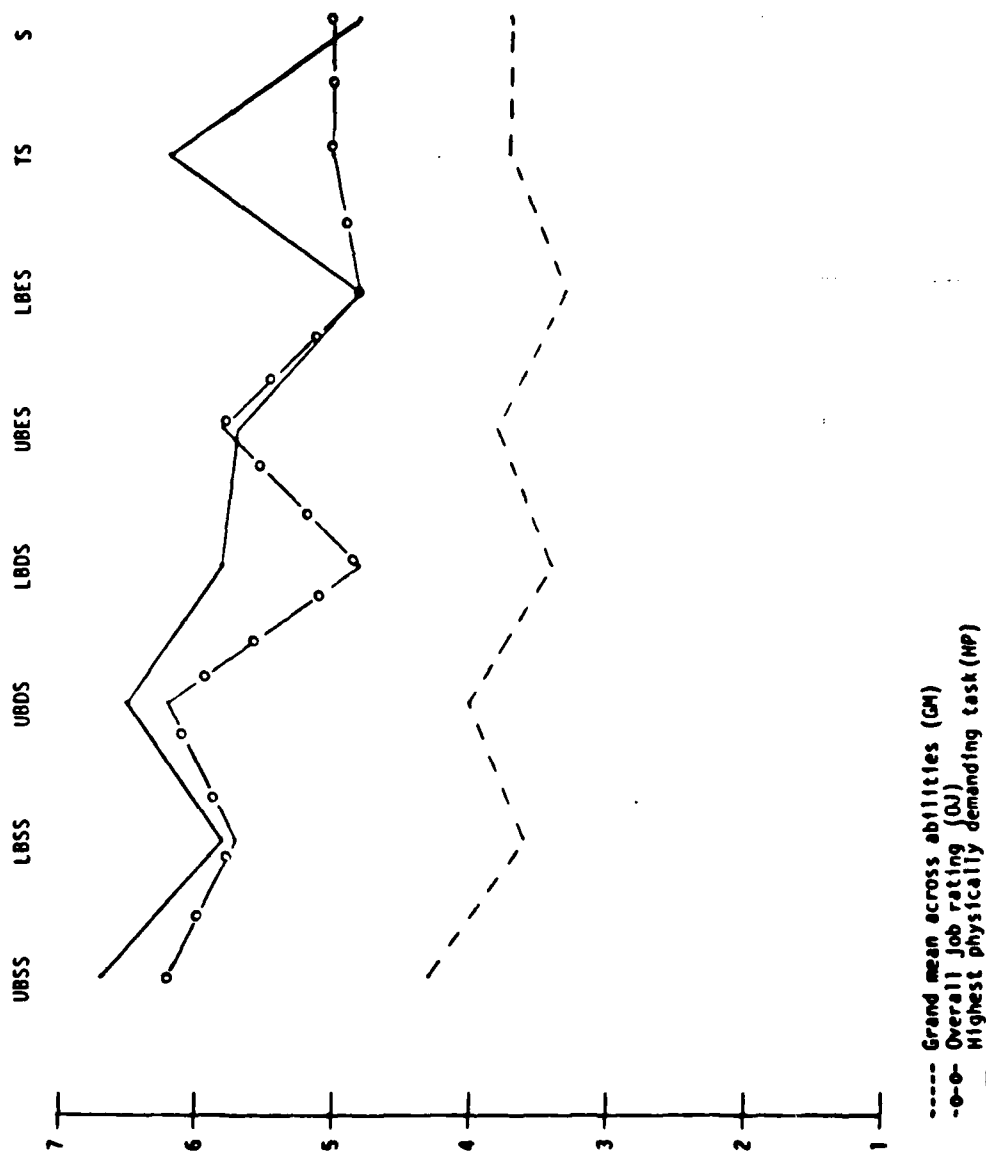


Figure 8. Comparison of three types of ratings for tank crewman.

Table 8
Differences on Three Types of Ratings for Tank Crewman

Variable	Mean	Standard Deviation	df	t value	P<
GM ¹	3.73	0.32	7	-12.89	.0001
OJ ²	5.44	0.61			
OJ	5.44	0.61	7	- 1.92	.096
HP ³	5.79	0.70			

¹ Grand mean across abilities for mean of each ability across tasks.

² Grand mean of overall job ratings across abilities.

³ Grand mean of highest physically demanding tasks across abilities.

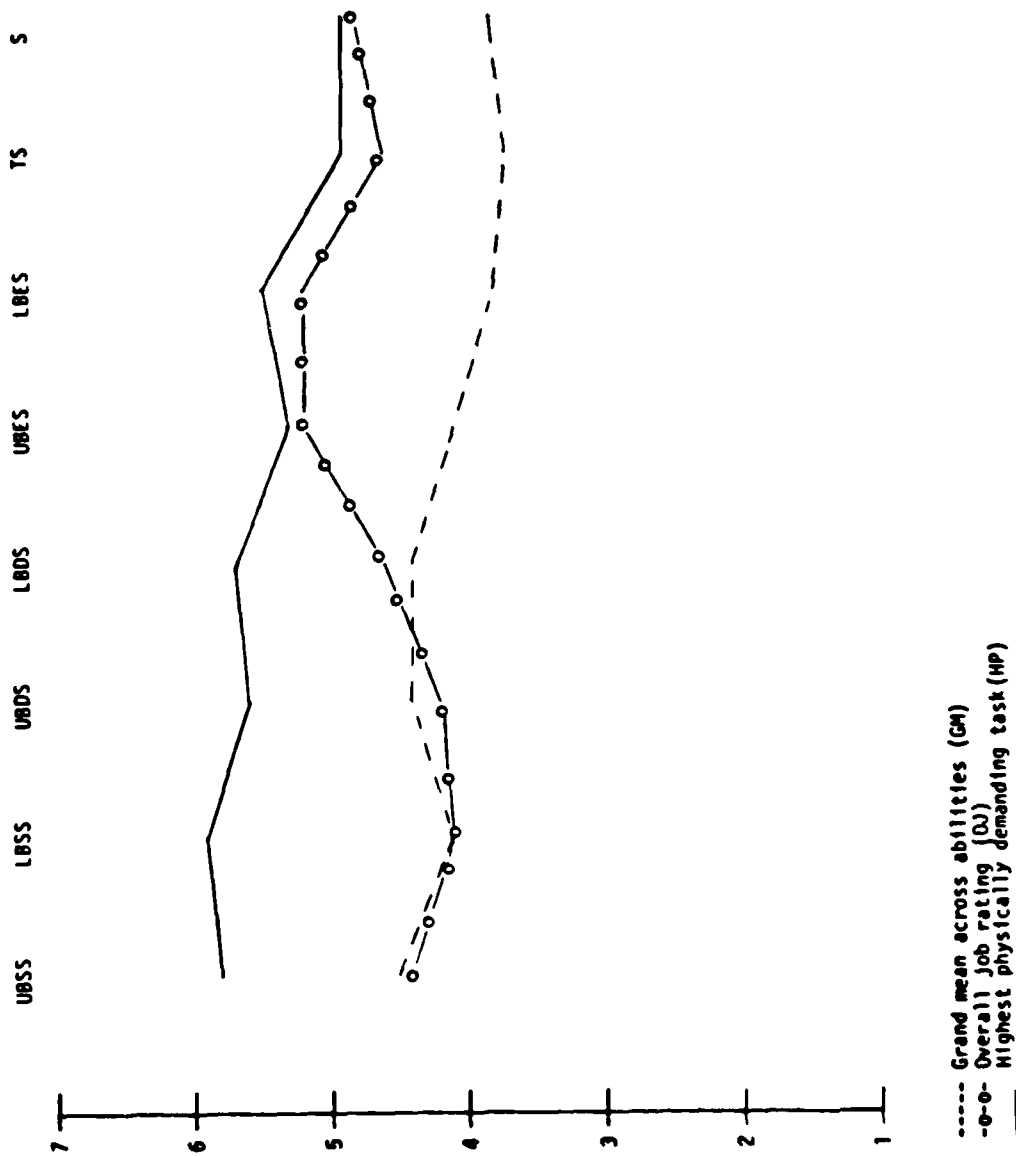


Figure 9. Comparison of three types of ratings for military police.

Table 9
Differences on Three Types of Ratings for Military Police

Variable	Mean	Standard Deviation	df	t value	P<
GM ¹	4.10	0.31	7	-2.42	0.046
OJ ²	4.64	0.41			
OJ	4.64	0.41	7	-3.35	0.012
HP ³	5.45	0.39			

¹ Grand mean across abilities for mean of each ability across tasks.

² Grand mean of overall job ratings across abilities.

³ Grand mean of highest physically demanding tasks across abilities.

Comparisons between MOSs Using Most Physically Demanding Tasks and Overall Job Ratings

The means of the highest physically demanding task in the eight abilities (UBSS, LBSS, UBDS, LBDS, UBES, LBES, TS, S) for each MOS are graphically illustrated in Figure 10. The grand means across abilities for Infantryman, Combat Engineer, Tank Crewman, and Military Police are 5.69, 5.80, 5.79, and 5.45, respectively (Table 10). Separate t tests between the variables resulted in no significant differences between any of the MOSs across abilities. The actual practical difference between these means indicates that there are tasks within each of the MOSs under study that have similar physical demands.

Figure 11 illustrates the comparison between MOSs using the overall job ratings on the eight abilities. It appears that the Military Police require less static and dynamic strength than does the Tank Crewman. However, the static and dynamic strength demands of the Infantryman and Combat Engineer appear to be similar. In contrast, the explosive strength, trunk strength, and stamina measures are similar across all four MOSs indicating comparable physical demands in the latter four abilities.

These comparisons suggest that the physical ability requirements for the four MOSs may be highly similar when considering the most physically demanding tasks. However, when the overall job was rated, the Military Police display a less demanding physical ability profile. It can be speculated that the Military Police tasks high in static and dynamic strength are infrequent, while the majority of the more frequent tasks occurring on a daily basis are low in strength. Collecting data on the three remaining MOSs will provide additional insight into the extent of the commonality among Army jobs.

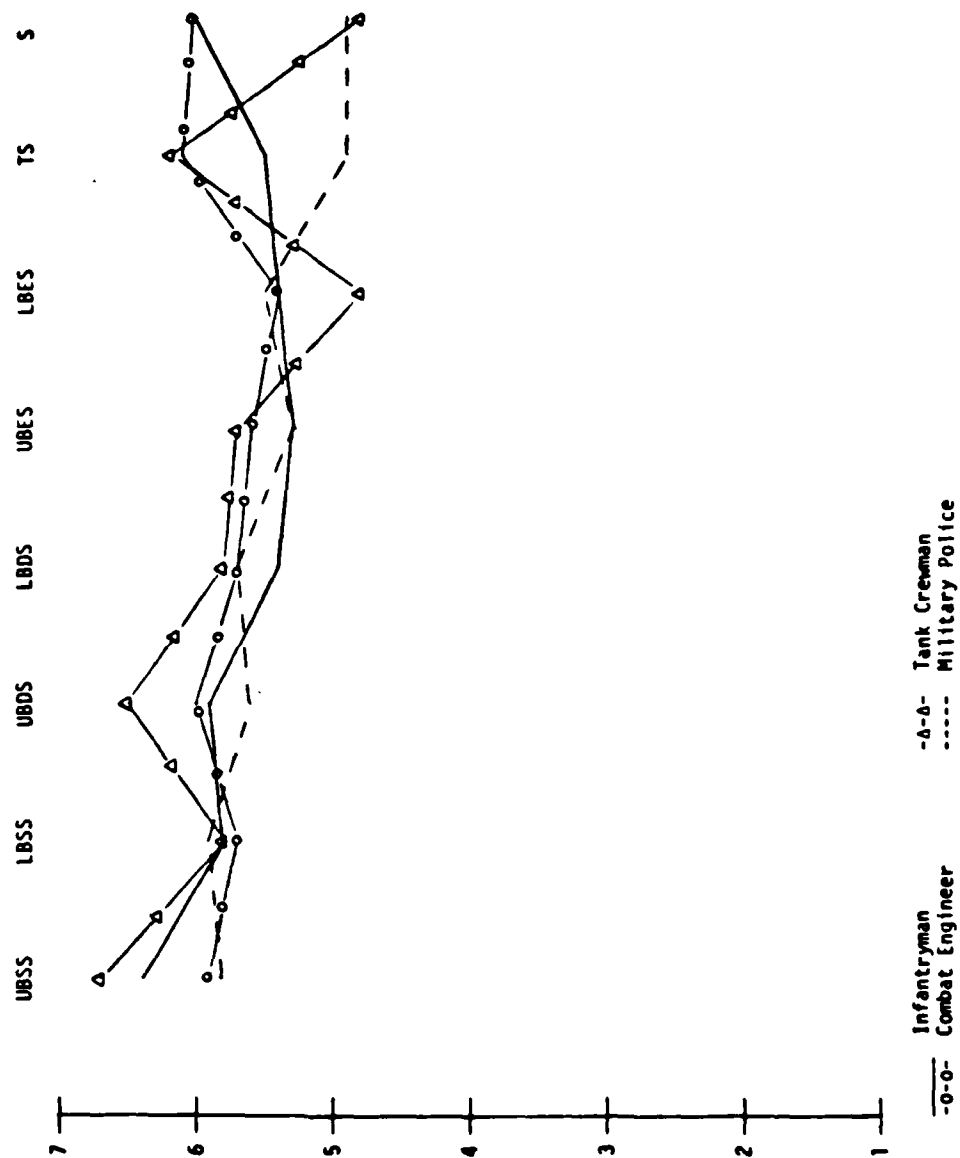


Figure 10. Comparison of the highest physically demanding tasks for each MOS across the eight abilities

Table 10
Mean Comparisons of the Highest Physically Demanding Tasks
Across Abilities for All MOSs

Variable	Mean	Standard Deviation	df	t value	P<
Infantryman Combat Engineer	5.71 5.80	0.38 0.24	7	-0.76	0.747
Infantryman Tank Crewman	5.71 5.91	0.38 0.58	7	-1.29	0.237
Infantryman Military Police	5.71 5.49	0.38 0.34	7	1.57	0.161
Combat Engineer Tank Crewman	5.80 5.91	0.24 0.58	7	-0.76	0.472
Combat Engineer Military Police	5.80 5.49	0.24 0.34	7	1.84	0.108
Tank Crewman Military Police	5.91 5.49	0.58 0.34	7	1.87	0.104

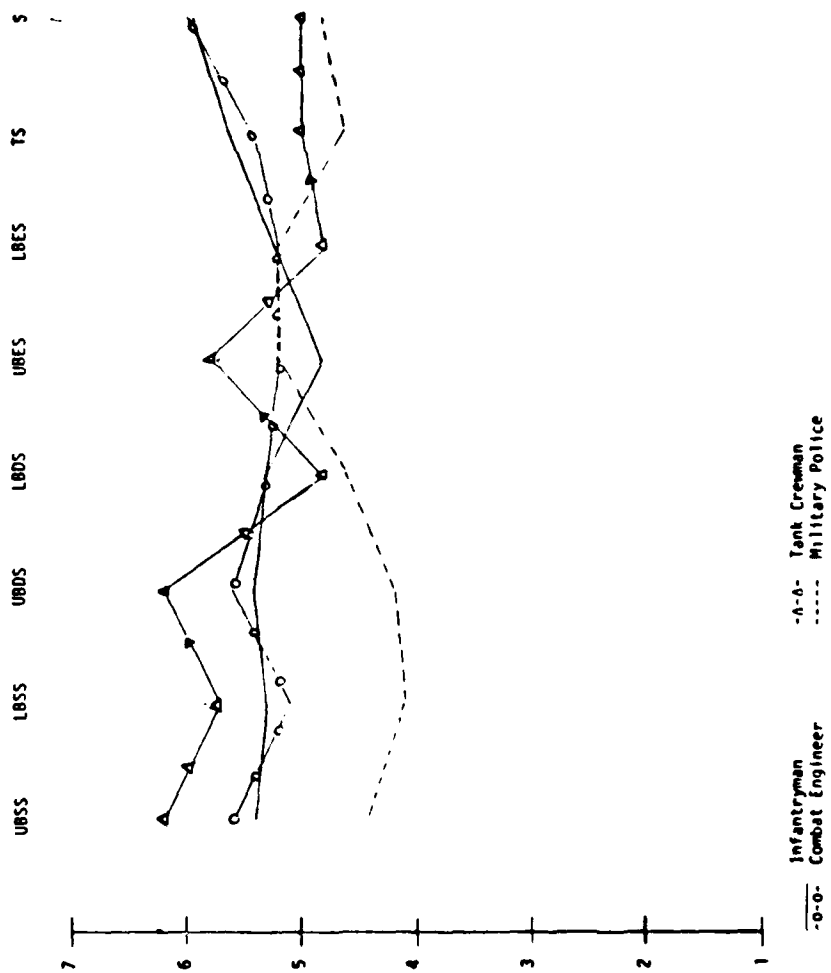


Figure 11. Comparison of overall job ratings for each MOS across eight abilities

DISCUSSION

The purpose of the two-year project is to advance the state of the art in job analysis and criterion development for physically demanding jobs so that these methods and the information derived from them could be used for a variety of Army personnel practices and procedures affecting the Army's utilization of men and women. The first year's objectives were to develop and evaluate a job analysis methodology for specifying the physical requirements of a sample of Army jobs. The findings indicated that the methodology is a feasible and a reliable approach for developing strength and stamina performance standards for Army jobs.

The major finding of the present research was that the job analytic procedure proved to be a reliable method for identifying physical ability requirements of Army jobs. Based on these requirements, physical ability profiles were developed for each MOS (i.e., Infantryman, Combat Engineer, Tank Crewman and Military Police). Each profile represented the physical ability requirements of a MOS in terms of either the most physically demanding criterion tasks, the average across tasks, or the overall job. The most physically demanding task for each of the eight strength and stamina factors indicated not only the points on the profile but also served as the standard to which a soldier might be expected to perform in order to meet the requirements of the particular MOS. It is assumed that soldiers who can perform the most physically demanding tasks are able to perform the less demanding tasks.

To ensure the physical ability standards were based on important criterion tasks, each task was judged in relation to its criticality (i.e., consequences of inadequate performance, delay tolerance, and learning difficulty). These provided an overall estimate of a task's criticality as well as providing a justification for establishing physical ability requirements based on that task. The results indicated that indices of criticality were reliable, in that the raters agreed on the relative criticality associated with the series of tasks representing the work of each MOS.

During the development and evaluation of the physical ability analysis procedures, several additional findings emerged. Previous research suggested static strength may be a double-faceted component and differences in physical abilities between males and females may depend upon the category of strength required. Therefore, the feasibility of separating the strength factors into upper and lower body extremities was explored. Of particular importance was the earlier finding that women's lower extremity static strength more closely approximates men's than does upper extremity static strength (Laubach, 1976). Since the same might have been true for dynamic and explosive strength new definitions and scales with empirically derived anchors were developed for each of the three strength factors. The scales focused on either upper body muscle groups (e.g., hand and arms) or lower body muscle groups (e.g., legs).

The findings indicated the scales were useful and psychometrically sound. Each scale possessed an acceptable level of interrater reliability. In addition, the changes in the physical requirement profiles across the different strength and stamina factors, as well as the low to moderate correlations between the factors suggested a certain amount of independence between the scales. There was, however, a tendency for the more physically demanding tasks to be rated high across several abilities suggesting some lack of differentiation between the scales (e.g., carrying panels from vehicle to bridge site was perceived to require both upper and lower static strength as well as upper and lower dynamic strength). This may be a result of the complexity of the tasks and/or inadequate understanding of the scales by the raters. Additional research is needed to investigate whether further delineation of the tasks into smaller, less complex elements, providing more extensive training aides, and/or using different selection criteria in choosing the raters as subject matter experts improve the degree of differentiation between the scales.

Another important finding involved comparisons between the physical ability profiles represented by the most demanding task, the overall job ratings, and the average ratings across all tasks within a particular MOS. Generally, the findings indicated that the perceived physical ability requirements of the overall job with no task information

provided more closely approximated the requirements based on the most physically demanding tasks than those based on average ratings across all MOS tasks. It appears that incumbent soldiers in providing the ratings for the overall job requirements focused on the more physically demanding task rather than estimating an average across a number of different tasks.

The attempt to identify team tasks did not prove useful. Soldiers did not differentiate between tasks requiring two or more persons for successful completion and tasks requiring only individual effort. Instead the raters believed most of the tasks to be team oriented, even though many of the tasks obviously did not require two soldiers to accomplish it. Perhaps they interpreted the definition of a team task too broadly to include tasks performed in the same geographical location (e.g., supervisor). Additional research needs to be done to clarify the nature of team work and its relationship to physical ability requirements. Perhaps, a revised definition of team work in terms of task requirements instead of percentages of time might be a more effective instrument. The empirical derivation of anchors for the different points on the scale might also yield better results.

Finally, the investigation revealed several sources of useful task analysis information ranging from general job descriptions (AR611-201) to more specific task inventories (MODB). Although the present research to develop and evaluate a procedure for identifying physical ability requirements of Army jobs required extensive task analysis steps, the use of the methodology in the future to study other MOSs will most likely not require any additional task data beyond the MODB. In fact, the present study suggested it may be possible to develop standards for additional MOSs on a judgmental basis without first obtaining task data. Because perceptions of physical ability requirements for overall job impressions closely approximated the requirements based on the most physically demanding tasks, it may be possible to convene a group of incumbent soldiers (e.g., 5-7) and allow them to first independently rate the overall job requirements without task information. Then the groups could discuss the ratings (i.e., using the average), identify the most physically demanding task for each strength and stamina factor and arrive at a consensus regarding whether the average rating

needs to be changed to more accurately reflect the most demanding task. This approach could prove to be an effective and economical way to identify physical ability requirements of additional Army MOSs.

The present study demonstrated that the job analysis procedure designed to identify the physical ability requirements of Army jobs is both feasible and reliable. However, it remains to be shown whether the procedure is valid. This must be determined before the Army can begin to use the procedure to establish physical ability requirements for all MOSs on a judgmental rather than empirical basis.

Although there are numerous alternative methods available to validate the job analytic procedure as well as the standards and measures derived from it, there is one particular approach that appears most fruitful. The validation is a two-step process. Each step focuses on the criterion tasks that represent the physical ability demands of a MOS as the vehicle to provide an empirical link between perceived job requirements obtained in the present study and the actual job requirements. The first step of the validation process would involve a test of the relationship between the physical ability requirements judged during the present study in terms of criterion tasks and the actual physical demands of those same tasks. The actual physical ability demands of the criterion tasks would be determined by investigating the network of relationships between performance of criterion tasks perceived to require a particular ability and known measures of that same physical ability. The second step of the validation would determine whether the physical ability requirements identified during the present study as critical are in fact important to job performance. It would explore the relationship between the physical proficiency of soldiers as measured by the criterion tasks and an index of job performance. Together the validation would represent an attempt to determine the efficacy of the judgments made by the incumbent soldiers regarding the amount and type of physical demands and the criticality (job relatedness) of the physical requirements of the MOSs.

With regard to the first step of the validation process it is possible to provide evidence of construct validity where an evaluation would be made of the judgments provided by the incumbent soldiers. Evidence for construct validity would depend on the existence of a statistical relationship between the criterion tasks (i.e., judged to be the most physically demanding tasks representing each strength and stamina factor) and known tests of different physical abilities. Since these tests would represent pure measures of known constructs (i.e., physical abilities), a high correlation between a pure test of a specific physical ability and a criterion task requiring that same ability should indicate validity. For example, soldiers who perform high on a general physical ability test (e.g., upper body dynamic strength) should also perform well on criterion tasks (e.g., unload boxes of ammunition from vehicles) which were judged in the present study to require high levels of that ability, while soldiers who lack the general physical ability as measured by the general test should have difficulty in performing the criterion task.

Validation is typically convergent, a confirmation by independent measurement procedures. However, to establish construct validity discriminant validation is also required. Criterion tasks may be invalidated by too high correlations with other measures from which they are intended to differ. It may be desirable to investigate both convergent and discriminant validity using a multitrait-multi-method matrix (Campbell & Fiske, 1959). Although the present research design does not completely adhere to the method prescribed by Campbell and Fiske, it may be possible to generate a matrix of the inter-correlations between all of the general physical ability tests and the criterion tasks. This matrix would reveal not only the commonality among the various physical proficiency measures but will also provide insight into a divergence between measures where they are expected to differ. For example, a criterion measure such as unloading ammunition boxes from vehicles judged by incumbent soldiers during the first year's study as requiring high levels of upper body static strength and low levels of lower body explosive strength should be highly correlated with the static strength test (i.e., convergence) and less correlated with the explosive strength test (i.e., discriminant).

The second step of the validation would focus on the criticality or job relatedness of the physical ability requirements provided by the incumbent soldiers during the present study. Indirectly, it would be an investigation into the efficacy with regard to the estimate of criticality of the physical ability requirements provided by the raters. Once again the primary vehicle for validation would be the criterion tasks. Since these criterion tasks have been shown to represent the different strength and stamina factors during the construct validation step, they can now be used to demonstrate an empirical link between physical proficiency of soldiers as measured by the criterion tasks and some index of job performance. Soldiers who are physically proficient should perform their physically demanding job duties more effectively, safely, and efficiently than less physically able soldiers. The assumption is that there is an underlying physical ability component for many duties performed by incumbent personnel. For example, the level of a soldier's upper body static strength may affect job performance such as the degree of accuracy in engaging targets with hand grenades. Indices of overall job effectiveness could include supervisory evaluations, promotions, accidents, medical records of illness, and awards, as well as indications of his unit's effectiveness. Another potential source of external criteria might be the soldier's performance during the SQT. In fact, it may be feasible to develop the validation study as part of the SQT process for the sample of soldiers under investigation.

In conclusion, the job analysis procedure appears to be a feasible and reliable method for identifying the physical ability requirements of Army jobs. Several products emerged from the research effort (1) reliable instruments for obtaining perceptions of the physical ability demands, (2) profiles for each MOS outlining the physical ability requirements in relation to criterion tasks (i.e., the most physically demanding tasks for each strength and stamina factor), (3) a criterion task manual containing the most physically demanding

tasks for each ability by MOS, and (4) a procedure manual which describes the steps necessary to establish physical ability requirements for additional MOSs (i.e., task analysis, physical abilities analysis and results). These developments and insights, however, represent only one component of the evaluation. A second component--validation--is necessary before the Army can begin to use the job analysis procedure to establish physical ability requirements for all MOSs on a judgmental rather than an empirical basis.

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APPENDIX A, DEPARTMENT OF LABOR'S JOB TECHNIQUE FOR ESTIMATING PHYSICAL DEMANDS OF JOBS

B. Physical Demands. This factor is expressed in terms of sedentary, light, medium, heavy, and very heavy. Please use the following 5 point scale:

- [1] Sedentary Work. Lifting 10 pounds maximum and occasionally lifting and/or carrying such articles as dockers, ledgers, and small tools. Although a sedentary task is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out the task. Tasks are sedentary if walking and standing are required only occasionally and all other sedentary criteria are met. The following are situations illustrating sedentary work: Sits at bench and inspects findings and finished pieces of jewelry for size, flaws, and defects in plating, using scales and tweezers. Items to be inspected are brought on a tray to the worker and weights lifted are negligible.

Repairs defects in hosiery by hand, using needle, thread, scissors, and mending cup, all of which weigh only a few ounces. Sewing is generally carried on while sitting.

Sits at desk most of day, takes dictation and transcribes it on typewriter. Occasionally walks to various parts of department, when called upon to take dictation, and carries papers and materials of negligible weight.

Sits at drawing board and walks occasionally. Carries negligible weights such as papers, instruments, and books.

- [2] Light Work. Lifting 20 pounds maximum with frequent lifting and/or carrying objects weighing up to 10 pounds. Even though the weight lifted may be only a negligible amount, a task will be in this category (1) when it requires walking or standing to a significant degree; or (2) when it requires sitting most of the time, but entails pushing and pulling of arm and/or leg controls. The following are situations illustrating light work: Lifts cans, jars, or bottles from cardboard carton and places them on conveyor. Removes filled or capped containers which weight approximately 2 or 3 pounds maximum from one conveyor belt and places them on another. Maintains a rapid constant pace to keep up with speed of filling or capping machine.

Constantly stands to set up and operate machine that cuts grooves in wooden parts. Continuously lifts, pulls, pushes, and carries lumber, fre-

quently weighing 1 to 5 pounds and occasionally as much as 15 to 20 pounds to feed it into the machine.

Walks and stands constantly while arranging records in file cabinets, drawers, boxes, etc. Sits occasionally to sort papers. Weight lifted does not have to meet certain criterion because greater part of day is spent walking and standing, and pushing and pulling file drawers.

Stands and walks behind counter of variety store all of working day wrapping and bagging articles for customers.

- [3] Medium Work. Lifting 50 pounds maximum with frequent lifting and/or carrying of objects weighing up to 25 lbs. The following are situations illustrating medium work: Fabricates articles and equipment out of sheet metal, occasionally carries tools and sheet metal, weighing 50 lbs. maximum, to workbench. Lifts sheet metal to workbench and machine, and pushes and pulls it into proper position.

Carries lumber, weighing up to 50 pounds, from supply room to workbench, a distance of approximately 20 feet. Stands greater part of day, bending, and lifting lumber. Pushes and pulls lumber on workbench or machine.

Lifts, pushes, and pulls to jack up automobile, to remove tire from wheel, and to remount tire on wheel. Most tires weigh approximately 25 pounds, but seldom weigh more than 50 pounds, and wheels are rolled instead of carried to repair work area.

Assists in lifting patients, pushing litters, and pulling sheets in making beds. Walks and stands constantly.

Walks and stands continuously when dismantling, testing, adjusting, repairing, and installing engine parts of an aircraft. Lifts and carries parts of engines weighing from 25 to 50 pounds for inspection and repair. Pushes and pulls components into position.

- [4] Heavy Work. Lifting 100 pounds maximum with frequent lifting and/or carrying of objects weighing up to 50 pounds. The following are situations illustrating heavy work: Digs trench to specified depth and width which involves a constant cycle of pushing shovel into earth and lifting, carrying, and throwing shovelfuls of earth onto a pile. Shovel is often raised to shoulder height and weight lifted

is concentrated at its end. Shovel and earth weigh approximately 20 pounds, but the continuous effort involved requires strength comparable to that required by frequent lifting up to 50 lbs., and occasional lifting up to 100 lbs.

Lifts and carries metal weighing 35 to 50 pounds to charge furnace. Frequently pushes and pulls from awkward crouching position to turn metal in furnace with tongs. Periodically withdraws metal from furnace and carries it with assistance to forge.

Frequently lifts and carries pipe and pipe connections weighing 50 lbs. and occasionally up to 100 lbs. and with aid of helpers, fits heavy pipe assemblies into place. Stands, stoops, and crouches while reaching above and below shoulder height to pull pipes into position and grasp pipes and tools. Pushing and pulling heavy objects from awkward positions requires more strength than performing these activities from a normal position. Pushing weights to above shoulder height involves greater force than lifting weights to waist level.

Stands all day to mix pastry. Lifts and carries 100 lbs. bags of flour about 20 feet from stack to mixing bowl. Turns and stoops to lift sugar and shortening each weighing 50 lbs. from lower tier and drums.

Pushes handtruck up and down warehouse aisles, to fill orders, stooping and lifting cartons or items with average weight of 65 lbs. and placing them on truck. Pushes items to wrapping area. Lifts cartons from truck in order to complete packing, wrapping, sealing, and labeling for shipping. Lifts cartons to skids for shipping.

- [5] Very Heavy Work. Lifting objects in excess of 100 pounds with frequent lifting and/or carrying of objects weighing 50 pounds or more. The following are situations illustrating very heavy work: Usually loads and unloads truck when transporting or delivering articles, such as furniture, refrigerators, and machinery, many of which weigh in excess of 100 lbs.

Loads and unloads trailers and semi-trailers with produce, such as crates of oranges, celery, tomatoes, and lettuce, weighing from 80 to 110 pounds.

Performs any or all machine and hand operations necessary to fabricate and assemble boilers, tanks, vats, and other vessels made of heavy steel plates weighing up to 120 pounds.

Installs ship's steam, diesel, or electric propelling and auxiliary machinery and equipment, such as pumps, cargo-handling machinery, anchor-handling gear, ventilating and firefighting equipment, steering gear, and armament.

14 May 1979

INSTRUMENT FOR CONDUCTING SEMI-STRUCTURED INTERVIEW
REGARDING THE NATURE OF THE PHYSICALLY DEMANDING TASKS

ARMY PHYSICAL PERFORMANCE STANDARDS PROJECT

We have completed the preliminary screening of Military Occupational Data Banks for physically demanding tasks for seven MOSs. This screening was based on our own internal review of the lists and research personnel at ARI knowledgeable of particular MOSs.

The next step will be to have additional experts like yourself, review the tentative list of physically demanding tasks for each MOS. They will investigate the comprehensiveness of the task list. That is, do the tasks cover the physical domain of the MOS? They will also focus on clarity and understandability of each task. Tasks that have varying demands will be defined more precisely (e.g., changing tires). Tasks that are too broad will be broken down into more specific tasks/elements (e.g., prepare bivouac area).

Please review the attached list of tasks that have been identified as physically demanding. Some of the tasks are specific enough to allow for reliable ratings of physical ability requirements. However, other tasks are too general and ambiguous, which may lead to unreliable ratings. Consequently, before we go into the field to collect the data, we need your assistance to examine each task and consider the following:

- Is the task clear and precise to allow for accurate (reliable) ratings by independent judges?
- If the task is too general and broad, then use the space provided to make notes regarding the specific nature of the task (e.g., subtasks).
- If the task has variable demands, then use the space provided to note the different demands (e.g., change tires on different sized vehicles).
- Are there any additional physically demanding tasks you consider important?

When you have completed your review, we will meet to discuss your findings. If you have any questions, please contact me at (301) 986-9000.

David C. Myers
Project Director

PHYSICAL PERFORMANCE STANDARDS

MILITARY POLICE 95B

The following list of tasks was selected from the Military Occupation Data Bank based on their physical demands. Before the tasks can be rated regarding the different physical ability requirements (e.g., stamina, static strength, explosive strength and dynamic strength), they need to be reviewed and edited by experts in order to insure the list of tasks is comprehensive and each task is clear and understandable.

C. PERFORM LAW ENFORCEMENT DUTIES

19. Apprehend law violators _____

20. Restrain law violators _____

21. Control uncooperative subjects _____

32. Confiscate and secure unauthorized weapons _____

34. Control spectators at special events _____

36. Control stray animals on military installation _____

D. PERFORM PHYSICAL SECURITY DUTIES

46. Search individuals/vehicles/material _____

D. PERFORM PHYSICAL SECURITY DUTIES (cont'd.)

47. Apprehend suspects violating security restrictions _____

F. PERFORM TRAFFIC ACCIDENT INVESTIGATION DUTIES

22. Assist in evacuating injured/deceased personnel _____

G. PERFORM MILITARY POLICE DOG HANDLING DUTIES

10. Bathe and groom dogs _____

21. Detect/apprehend intruders with dogs _____

H. PERFORM MILITARY POLICE INVESTIGATIVE DUTIES

7. Apprehend/guard suspects at crime scene _____

I. PERFORM CIVIL DISTURBANCE CONTROL DUTIES

12. Conduct joint civil/military CD patrols _____

17. Secure likely targets _____

I. PERFORM CIVIL DISTURBANCE CONTROL DUTIES

18. Secure/safeguard public utilities and critical facilities _____

19. Protect fire/service personnel and equipment during CD OPS _____

20. Control crowd with unit in riot control formation _____

21. Control crowd with riot control agent munitions _____

22. Control crowd with high pressure water _____

23. Control crowd with riot control agent disperser _____

26. Identify/neutralize special threats/snipers _____

28. Identify and seize unauthorized items during CD operations _____

29. Apprehend/detain violators during CD operations _____

I. PERFORM CIVIL DISTURBANCE CONTROL DUTIES (cont'd.)

33. Evacuate personnel/equipment during CD operations _____

P. PERFORM WEAPONS OPERATOR MAINTENANCE DUTIES

13. Qualify with crew-served weapons _____

Q. PERFORM MILITARY POLICE SUPPLY/EQUIPMENT DUTIES

13. Receive/unpack MP supplies _____

14. Receive/unpack MP equipment _____

S. PERFORM COMMUNICATION/SIGNAL DUTIES

23. Install and remove communication/signal equipment _____

24. Erect antennas _____

T. PERFORM WHEELED VEHICLE OPERATOR DUTIES

1. Conduct pre/during/after vehicle operation maintenance _____

T. PERFORM WHEELED VEHICLE OPERATOR DUTIES (cont'd.)

8. Load/unload vehicles _____

14. Repair tires _____

18. Perform emergency repairs on vehicle _____

V. PERFORM SAFETY/FIRST AID/FIRE PREVENTION DUTIES

10. Administer first aid in real/simulated situations _____

11. Evacuate sick/wounded personnel _____

19. Correct fire hazards and violations _____

23. Replace fire extinguishers _____

APPENDIX C. FINAL TASK BANKS FOR SEVEN MOSs--INFANTRYMAN, COMBAT ENGINEER, TANK CREWMAN,
MOTOR TRANSPORT OPERATOR, STORAGE SPECIALIST, MEDICAL SPECIALIST, AND
MILITARY POLICE

INFANTRYMAN 11B

- ___ 1. Position casualties on litters during medical evacuation.
- ___ 2. Carry a casualty on a litter using a one-man pull for 2 hours over hilly terrain.
- ___ 3. Carry a casualty on a litter using the two-man technique for 2 hours over hilly terrain.
- ___ 4. Arm-carry a casualty for 400 meters over hilly terrain.
- ___ 5. Load a casualty onto a vehicle.
- ___ 6. Unload a casualty from a vehicle.
- ___ 7. Move as member of fire team in full gear (i.e., 50 lb. rucksack, pistol belt, canteen, ammo pouches, individual weapon and steel helmet), for 6 hours over hilly terrain.
- ___ 8. Move under direct fire in full gear.
- ___ 9. Move through a stream waist deep.
- ___ 10. Move over an 8 ft. concrete obstacle.
- ___ 11. Maneuver through and around barbed wire obstacle.
- ___ 12. Perform rush for 75 meters within 25 seconds.
- ___ 13. Perform high crawl for 35 meters.
- ___ 14. Perform low crawl for 35 meters.
- ___ 15. Camouflage vehicles using nets and poles (e.g., tanks and 2½ ton truck).
- ___ 16. Dig a one-man foxhole.
- ___ 17. Dig a two-man foxhole.
- ___ 18. Climb a 20 ft. tree to erect field expedient antenna.
- ___ 19. Engage targets with M16A1 rifle.
- ___ 20. Mount/dismount .50 caliber machine gun.
- ___ 21. Engage targets with .50 caliber machine gun.
- ___ 22. Position and emplace M60 machine gun.
- ___ 23. Construct M60 machine gun positions.
- ___ 24. Load/unload small arms ammunition onto vehicles.
- ___ 25. Load/unload anti-armor ammunition onto vehicles.
- ___ 26. Load/unload mortar ammunition onto vehicles.
- ___ 27. Engage enemy target with hand grenade at a distance of at least 40 meters.

INFANTRY MAN 11B (cont'd)

- _____ 28. Remove track from vehicle.
- _____ 29. Carry new track to vehicle (30 lb. blocks of 5 shoes).
- _____ 30. Tighten track with "track jack" and set pins.
- _____ 31. Tighten nuts on track with wrench.
- _____ 32. Change tire on jeep.
- _____ 33. Change tire on 1/4 ton truck.
- _____ 34. Change tire on a 3/4 ton truck.
- _____ 35. Change tire on 2 1/2 ton truck.
- _____ 36. Change tire on 5 ton truck.
- _____ 37. Load/unload cases of rations from vehicle.
- _____ 38. Load/unload communications equipment from vehicle.
- _____ 39. Load/unload NBC equipment from vehicles.
- _____ 40. Load/unload weapons from vehicle.
- _____ 41. Carry water in two 5-gallon cans for 100 meters to obtain drinking water.
- _____ 42. Construct field latrines (2'X4').
- _____ 43. Participate in daylight jump.
- _____ 44. Recover own parachute.
- _____ 45. Rappel from a 30 ft. tower.
- _____ 46. Administer mouth to mouth resuscitation for 45 minutes.
- _____ 47. Perform external heart massage.

Combat Engineer 12B

- ___ 1. Carry sand bags to build a bunker.
- ___ 2. Dig a one man foxhole using an entrenching tool.
- ___ 3. Construct a machine gun emplacement.
- ___ 4. Dig a skirmishers trench using the long handled shovel.
- ___ 5. Excavate earth from around a small foundation using D-handle shovel.
- ___ 6. Break up road surface using pneumatic paving breaker.
- ___ 7. Cut down trees 8 inches in diameter using a chain saw to make logs for an expedient road surface.
- ___ 8. Dig a two man foxhole using an entrenching tool.
- ___ 9. Cut down a tree 10 inches in diameter using a 2 man cross cut saw to make log box culverts.
- ___ 10. Loosen the hard clay soil with a pick to construct a shelter.
- ___ 11. Dig postholes using posthole digger for anchoring a bridge.
- ___ 12. Dig postholes using posthole auger for anchoring a bridge.
- ___ 13. Pack down loose earth around a foundation using backfill tamper.
- ___ 14. Cut down trees using a single-bitted axe to clear a bridge site.
- ___ 15. Smooth logs with an adz for making posts.
- ___ 16. Load/unload pioneer tool kit from vehicle.
- ___ 17. Carry lumber to work site (e.g., 4'x8' plywood, 2"x8"x16' and 2"x6"x10') for constructing shelters and bunkers.
- ___ 18. Cut lumber to specification using one man hand saw (e.g., 2"x4"x10').
- ___ 19. Break up surface of road using double-faced sledge.
- ___ 20. Climb 20 foot poles to install communication wire.
- ___ 21. Move logs using the peavy in order to construct expedient obstacles.
- ___ 22. Drive U-shaped pickets into ground with metal hammer in order to install barbed wire obstacles.
- ___ 23. Carry rolls of concertina wire or barbed wire to work site to be used for constructing obstacles.

- ___ 24. Install steel paving form to construct a concrete headwall.
- ___ 25. Haul dirt in a wheelbarrow while digging a small foundation.
- ___ 26. Load dirt into haul unit using a shovel.
- ___ 27. Carry bags of cement from vehicle to work site.
- ___ 28. Load sand and gravel into hopper of 16S mixer.
- ___ 29. Level fresh cement with board (screen).
- ___ 30. Climb a ladder holding a bundle of shingles for repairing a damaged roof.
- ___ 31. Install shingles using hammer and nails to repair a damaged roof.
- ___ 32. Carry two one gallon buckets of paint up on a scaffold to paint ceiling.
- ___ 33. Paint a ceiling using brushes and rollers.
- ___ 34. Install metal pipe culverts to provide drainage around an air field.
- ___ 35. Clean drainage ditches located along a road using a shovel.
- ___ 36. Clean culverts along a road using a shovel.
- ___ 37. Unload wire mesh from vehicle in order to construct expedient road surface.
- ___ 38. Roll out wire mesh on road surface.
- ___ 39. Stake mesh down to finish expedient road surface.
- ___ 40. Remove rock and stumps using a shovel and pickmatic before installing aluminum landing mats.
- ___ 41. Unload aluminum landing mats from vehicle and emplace mats on the field.
- ___ 42. Camouflage equipment using poles and nets.
- ___ 43. Unload mines at mine dump.
- ___ 44. Make lashings to construct a gin pole.
- ___ 45. Make shears to lash logs together in order to build an expedient road surface.
- ___ 46. Construct a Bailey bridge:
 - ___ 46a. Eight men carry transom from vehicle to bridge site.
 - ___ 46b. Six men carry panels from vehicle to bridge site.
 - ___ 46c. Connect the end of the transom to top of the panels using a raker.

- ___ 46d. Install bracing.
- ___ 46e. Emplace stringers.
- ___ 46f. Emplace chess to form the road surface of the bridge.
- ___ 46g. Install riband to serve as the bridge's curb.
- 47. Construct MAT6 float bridge:
 - ___ 47a. Unload float from vehicle.
 - ___ 47b. Unroll float and inflate.
 - ___ 47c. Connect two half floats.
 - ___ 47d. Four men carry saddle adapter from vehicle to bridge site.
 - ___ 47e. Install panels.
 - ___ 47f. Install deck balk.
 - ___ 47g. Move decking into place using a 60" pinch bar.
- 48. Construct light tactical raft/bridge (LTR).
 - ___ 48a. Ten men carry ponton from vehicle to bridge site.
 - ___ 48b. Two men maneuver pontons in water in order to hook them together with pins.
 - ___ 48c. Four men carry decking from vehicle to bridge site.
 - ___ 48d. Emplace decking onto pontons.
 - ___ 48e. Carry ramps from vehicle to bridge.
 - ___ 48f. Install picket holdfasts to tie onto for anchorage.
- 49. Use an Assault boat:
 - ___ 49a. Remove boat from vehicle.
 - ___ 49b. Inflate boat using foot pump.
 - ___ 49c. Carry boat to water.
 - ___ 49d. Mount outboard motor.
 - ___ 49e. When motor is unavailable paddle boat across river (3 man crew).
- 50. Anchorage system for float bridge.
 - ___ 50a. Install shore guys secured by deadmen.
 - ___ 50b. Erect an anchor tower securing them by guy lines.

Basic Combat/Tactical Operations

- ___ 51. Administer mouth to mouth resuscitation for 45 minutes.
- ___ 52. Perform external heart massage.
- ___ 53. Position casualties on litters during medical evacuation.

- ____ 54. Carry casualties on litters using two-man technique during medical evacuation.
- ____ 55. Carry casualties on litters using one-man pull during medical evacuation.
- ____ 56. Move as a member of a fire team.
- ____ 57. Move over, through and around barbed wire obstacles.
- ____ 58. Construct individual defensive position.
- ____ 59. Camouflage equipment using nets and poles.
- ____ 60. Perform operator maintenance on M16A1 rifle, magazine, and ammunition.
- ____ 61. Engage enemy targets with M16A1 rifle.
- ____ 62. Engage enemy targets with hand grenades.
- ____ 63. Load/unload ammunition and supplies from vehicles.
- ____ 64. Change tires to maintain the unit's vehicles.

CREWMAN 19E

- ___ 1. Unload machine gun (50 cal. and coax) ammunition from vehicles.
- ___ 2. Unload main gun ammunition from vehicle.
- ___ 3. Remove ammunition from containers.
- ___ 4. Pass ammunition from ground to person on turret.
- ___ 5. Remove round from ammo well and load M60/M60A1 tank main gun for three successive firings.
- ___ 6. Unload misfired main gun round from M60/M60A1 tank.
- ___ 7. Throw misfired round out of turret in combat situation.
- ___ 8. Disassemble/assemble M60/M60A1 tank breech mechanism.
- ___ 9. Loosen bolts and nuts in order to remove armored/track vehicle engines.
- ___ 10. Remove armored/track vehicle tracks.
- ___ 11. Carry new track to vehicle (30 lb. blocks of 5 shoes).
- ___ 12. Tighten track with "track jack" and set pins.
- ___ 13. Tighten nuts on track with wrench.
- ___ 14. Load/unload armored/track vehicle according to loading plan to include personal gear, sockets, wrenches, pioneer tools, radio, machine guns, ramming staff, gunner roll, camouflage nets, tents and stoves.
- ___ 15. Mount armored/track vehicle from rear sprocket when on range.
- ___ 16. Mount armored/track vehicles from right front when not on range.
- ___ 17. Escape from burning armored/track vehicle.
- ___ 18. Pull unconscious crew member out of burning armored/track vehicle.
- ___ 19. Escape from overturned armored/track vehicle.
- ___ 20. Engage ammunition selector lever.
- ___ 21. Open/close hatches (drivers, loaders, commanders).

Basic Combat/Tactical Operations

- ___ 22. Administer mouth to mouth resuscitation for 45 minutes.
- ___ 23. Perform external heart massage.
- ___ 24. Position casualties on litters during medical evacuation.
- ___ 25. Carry casualties on litters using two-man technique during medical evacuation.
- ___ 26. Carry casualties on litters using one-man pull during medical evacuation.

- ____ 27. Move as a member of a fire team.
- ____ 28. Move over, through and around barbed wire obstacles.
- ____ 29. Construct individual defensive position.
- ____ 30. Camouflage equipment using nets and poles.
- ____ 31. Perform operator maintenance on M16A1 rifle, magazine, and ammunition.
- ____ 32. Engage enemy targets with M16A1 rifle.
- ____ 33. Engage enemy targets with hand grenades.
- ____ 34. Load/unload ammunition and supplies from vehicles.
- ____ 35. Change tires to maintain the unit's vehicles.

Motor Transport Operator 64C

- ___ 1. Remove rocks and other objects from dual wheels.
- ___ 2. Drive 2½ ton vehicle in convoy.
- ___ 3. Drive 2½ ton vehicle over cross-country obstacles.
- ___ 4. Drive 2½ ton vehicle on snow/ice/slick roads.
- ___ 5. Drive 2½ ton vehicle in mountainous terrain.
- ___ 6. Drive 2½ ton vehicle in still water/streams/rivers.
- ___ 7. Drive 2½ ton vehicle in sand and mud.
- ___ 8. Drive 2½ ton vehicle on side roads and unimproved roads.
- ___ 9. Load cargo and equipment onto vehicles (e.g., ammunition, supplies, food, and weapons.)
- ___ 10. Lash cargo and equipment to vehicles.
- ___ 11. Unload cargo and equipment from vehicles (e.g., ammunition, supplies, food, and weapons).
- ___ 12. Couple and uncouple tractors and trailers.
- ___ 13. Replace hoses, wires and gaskets in performing organizational maintenance.
- ___ 14. Replace oil filters to maintain vehicles.
- ___ 15. Replace fuel filters to maintain vehicles.
- ___ 16. Replace vehicle batteries to maintain vehicles.
- ___ 17. Remove lugs using wrench in order to change a tire on a ½ ton jeep.
- ___ 18. Remove tire from axle in order to change a tire on a ½ ton jeep.
- ___ 19. Pull tire off rim in order to change a tire on a ½ ton jeep.
- ___ 20. After repairing the tire place it back on axle in order to change a tire on a ½ ton jeep.
- ___ 21. Tighten lugs using wrench in order to change a tire on a ½ ton jeep.
- ___ 22. Remove lugs using wrench in order to change a tire on a 2½ ton vehicle.
- ___ 23. Remove tire from axle in order to change a tire on a 2½ ton vehicle.

- ____ 24. Pull tire off rim in order to change a tire on a 2½ ton vehicle.
- ____ 25. After repairing the tire place it back on axle in order to change a tire on a 2½ ton vehicle.
- ____ 26. Tighten lugs using wrench in order to change a tire on a 2½ ton vehicle.
- ____ 27. Remove lugs using wrench in order to change a tire on a 5 ton vehicle.
- ____ 28. Remove tire from axle in order to change a tire on a 5 ton vehicle.
- ____ 29. Pull tire off rim in order to change a tire on a 5 ton vehicle.
- ____ 30. After repairing the tire place it back on axle in order to change tire on a 5 ton vehicle.
- ____ 31. Tighten lugs using wrench in order to change a tire on a 5 ton vehicle.
- ____ 32. Remove lugs using wrench in order to change a tire on a 22½ ton vehicle.
- ____ 33. Remove tire from axle in order to change a tire on a 22½ ton vehicle.
- ____ 34. Pull tire off rim in order to change a tire on a 22½ ton vehicle.
- ____ 35. After repairing the tire place it back on axle in order to change tire on a 22½ ton vehicle.
- ____ 36. Tighten lugs using wrench in order to change a tire on a 22½ ton vehicle.
- ____ 37. Install tarps and bows to prepare vehicles for inclement weather operation.
- ____ 38. Remove canvas to prepare vehicle for combat operation.
- ____ 39. Sand bag floors to prepare vehicle for combat operation.
- ____ 40. Carry tire chains to vehicles for installation.
- ____ 41. Install tire chains on vehicle tires to prepare for inclement weather operation.
- ____ 42. Carry tow bar to prepare one vehicle to tow another vehicle.
- ____ 43. Attach tow bar to vehicle.

- ___ 44. Unpack and store vehicle repair parts (e.g., breaker, fire extinguishers, wrenches and ovm box.)

Basic Combat/Tactical Operations

- ___ 45. Administer mouth to mouth resuscitation for 45 minutes.
- ___ 46. Perform external heart massage.
- ___ 47. Carry casualties on litters using two-man technique during medical evacuation.
- ___ 48. Carry casualties on litters using one-man pull during medical evacuation.
- ___ 49. Move as a member of a fire team.
- ___ 50. Move over, through and around barbed wire obstacles.
- ___ 51. Construct individual defensive position.
- ___ 52. Camouflage equipment using nets and poles.
- ___ 53. Perform operator maintenance on M16A1 rifle, magazine, and ammunition.
- ___ 54. Engage enemy targets with M16A1 rifle.
- ___ 55. Engage enemy targets with hand grenades.
- ___ 56. Load/unload ammunition and supplies from vehicles.

STORAGE SPECIALIST 76V

- ___ 1. Place bridge plate for unloading materiel
- ___ 2. Place portable ramp for unloading materiel
- ___ 3. Remove blocking/bracing/cushioning devices
- ___ 4. Unload manually medical supplies from storage space
- ___ 5. Unload manually clothing supplies and field equipment from storage space
- ___ 6. Unload manually ammunition from storage space
- ___ 7. Unload manually laundry from storage space
- ___ 8. Unload manually food supplies from storage space
- ___ 9. Move manually laundry to designated storage area
- ___ 10. Move manually clothing supplies and field equipment to sorting areas
- ___ 11. Move manually food supplies to sorting areas
- ___ 12. Move manually medical supplies to sorting areas
- ___ 13. Move manually ammunition to sorting areas
- ___ 14. Remove bridge plate after receiving materiel
- ___ 15. Remove portable ramp after receiving materiel
- ___ 16. Stack palletized food supplies
- ___ 17. Load manually laundry into vehicle
- ___ 18. Load food supplies manually into vehicle
- ___ 19. Load manually ammunition into vehicle
- ___ 20. Load manually medical supplies into vehicle
- ___ 21. Load manually clothing supplies and field equipment into vehicle
- ___ 22. Block and brace materiel on carrier
- ___ 23. Secure items to containers by blocking/bracing/anchoring

Basic Combat/Tactical Operations

- ____ 24. Administer mouth to mouth resuscitation for 45 minutes
- ____ 25. Perform external heart massage
- ____ 26. Position casualties on litters during medical evacuation
- ____ 27. Carry casualties on litters using two-man technique during medical evacuation
- ____ 28. Carry casualties on litters using one-man pull during medical evacuation
- ____ 29. Move as a member of a fire team
- ____ 30. Move over, through and around barbed wire obstacles
- ____ 31. Construct individual defensive position
- ____ 32. Camouflage equipment using nets and poles
- ____ 33. Perform operator maintenance on M16A1 rifle, magazine, and ammunition
- ____ 34. Engage enemy targets with M16A1 rifle
- ____ 35. Engage enemy targets with hand grenades
- ____ 36. Change tires to maintain the unit's vehicles

Medical Specialist 91B

- ___ 1. Open and dress litters.
- ___ 2. Position casualties with possible back injuries on litters during a medical evacuation.
- ___ 3. Position casualties with simple fractures of the arms and legs on litters.
- ___ 4. Secure casualties on litters.
- ___ 5. Carry casualties on litters using 2 man technique during medical evacuation.
- ___ 6. Carry casualties on litters with possible broken necks during medical evacuation.
- ___ 7. Carry casualties using arm-carry technique during medical evacuation.
- ___ 8. Lift and carry a casualty from a litter to a hospital bed.
- ___ 9. Carry casualties on litters using 1 man pull technique during a medical evacuation.
- ___ 10. Load and unload casualties from field ambulances.
- ___ 11. Wrap casualties in blankets.
- ___ 12. Administer mouth to mouth resuscitation for 45 minutes.
- ___ 13. Administer external cardiac massage.
- ___ 14. Apply tourniquets to control hemorrhaging.
- ___ 15. Install board splints to fractured lower leg.
- ___ 16. Attend a casualty having a seizure by restraining him.
- ___ 17. Lift patient from bed into wheelchair.
- ___ 18. Wheel patients in wheelchairs up hospital ramp.
- ___ 19. Make and unmake beds.
- ___ 20. Turn bed mattresses.
- ___ 21. Remove and replace bed mattresses.

Medical Specialist 91B (Cont.)

- ___ 22. Move clinic furniture to clean ward.
- ___ 23. Clean and arrange medical utility room.
- ___ 24. Clean and arrange medical workroom.
- ___ 25. Clean and arrange medical linen room.
- ___ 26. Remove/replace medical facility fire extinguishers.
- ___ 27. Push patient beds with wheels in order to evacuate patients during fires.
- ___ 28. Pack/unpack medical supplies.
- ___ 29. Pack/unpack medical equipment.
- ___ 30. Load/unload generator sets.
- ___ 31. Change tires on medical vehicles.

Basic Combat/Tactical Operations

- ___ 32. Move as a member of a fire team.
- ___ 33. Move over, through, and around barbed wire obstacles.
- ___ 34. Construct individual defensive position.
- ___ 35. Camouflage equipment using nets and poles.
- ___ 36. Perform operator maintenance on M16A1 rifle, magazine, and ammunition.
- ___ 37. Engage enemy targets with M16A1 rifle.
- ___ 38. Engage enemy targets with hand grenades.
- ___ 39. Load/unload ammunition with supplies from vehicles.

MILITARY POLICE 95B

- ___ 1. Run through wooded area for approximately 1.6 kilometers to apprehend a law violator
- ___ 2. Climb over a 6 foot wall in pursuit of a law violator
- ___ 3. Restrain a law violator using night stick and handcuffs
- ___ 4. Control an uncooperative subject in a bar using hand to hand combat
- ___ 5. Control an uncooperative subject using a night stick
- ___ 6. Pull two men apart in an attempt to break up a fight (AFRAY)
- ___ 7. Assist in evacuating injured/deceased personnel at scene of a traffic accident
- ___ 8. Conduct joint civil/military CD patrols in full gear
- ___ 9. Climb fire escape of five story building to roof for observation of CD operation
- ___ 10. Climb a tree to spot violators participating in a civil disturbance
- ___ 11. Control crowd with unit in riot control formation using riot baton
- ___ 12. Control crowd with riot control agent munitions
- ___ 13. Control crowd with high pressure water
- ___ 14. Apprehend/detain violators during CD operations using riot baton
- ___ 15. Apprehend/detain violators during CD operations using hand to hand combat

Basic Combat/Tactical Operations

- ___ 16. Administer mouth to mouth resuscitation for 45 minutes
- ___ 17. Perform external heart massage
- ___ 18. Position casualties on litters during medical evacuation
- ___ 19. Carry casualties on litters using two-man technique during medical evacuation
- ___ 20. Carry casualties on litters using one-man pull during medical evacuation.

- ___ 21. Move as a member of a fire team.
- ___ 22. Move over, through and around barbed wire obstacles.
- ___ 23. Construct individual defensive position
- ___ 24. Camouflage equipment using nets and poles
- ___ 25. Perform operator maintenance on M16A1 rifle, magazine, and ammunition
- ___ 26. Engage enemy targets with M16A1 rifle
- ___ 27. Engage enemy targets with hand grenades
- ___ 28. Load/unload ammunition and supplies from vehicles
- ___ 29. Change tires to maintain the unit's vehicles

APPENDIX D, RESULTS FROM UPPER AND LOWER BODY STRENGTH ANCHORS

Results for Upper Body Static Strength Anchors

Anchors	Mean	Standard Deviation
1. Place a dish from the counter onto a shelf.	1.18	.50
2. Lift a 90 lb. box from the table to a shelf 5 ft. high.	6.40	.79
3. Hold a bag of cement.	5.29	1.65
4. Reach up and lower a 10 lb. box from 5 ft. high cabinet.	3.00	1.11
5. Lift a 30 lb. box from a table to a shelf 5 ft. high.	4.19	1.08
6. Lift a 70 lb. box from a table to a shelf 5 ft. high.	5.73	1.08
7. Reach under a table and pull out a 90 lb. box.	5.05	1.43
8. Reach under a table and pull out a 70 lb. box.	4.22	1.19
9. Reach over and behind a table in order to lift a 30 lb. box onto the table.	4.95	1.17
10. Push an electric vacuum cleaner.	1.68	.65
11. Push a heavy file cabinet across the room.	5.09	1.48
12. Reach over and behind a table in order to lift a 50 lb. box onto the table.	6.04	1.09
13. Reach up and lower a 50 lb. box from a 5 ft. high cabinet.	4.78	1.07
14. Lift a 50 lb. box from a table to a shelf 5 ft. high.	5.13	1.08
15. Reach under a table and pull out a 30 lb. box.	2.77	.97
16. Reach under a table and pull out a 50 lb. box.	3.60	.91
17. Reach over and behind a table in order to lift a 90 lb. box onto the table.	6.78	.69
*18. Lift one package of bond paper.	1.41	.59
19. Carry a tray of dishes.	2.36	.73
*20. Reach over and behind a table in order to lift a 70 lb. box onto the table.	6.23	1.02
21. Reach up and lower a 30 lb. box from a 5 ft. high cabinet.	3.55	1.01
22. Paint, wallpaper, perform masonry work.	3.50	1.63
23. Carry a football 50 yards.	1.68	1.36
24. Carry a 5 lb. bag of sugar five blocks.	2.27	.98
25. Move a frying pan from the stove to the sink.	1.13	.35

*Anchors selected for scales.

Anchors	Mean	Standard Deviation
26. Push a salt shaker across a table.	1.00	.00
27. Carry a 20 lb. baby from one room to another.	2.23	.69
28. Carry a 100 lb. camera on your shoulder.	5.23	1.60
29. Pull a sack of mulch across a yard (25').	3.82	1.22
30. Lift a carton of bonded paper.	3.50	1.57
31. Push empty hand cart across the room.	1.45	.51
*32. Carry a 5 gallon bucket of water.	3.73	1.20

*Anchors selected for scales.

Results for Lower Body Static Strength Anchors

Anchors	Mean	Standard Deviation
1. Hold clutch pedal down on half-ton truck.	2.36	1.21
2. Stand on a plank leading into a moving van with a 70 lb. chair on your back.	5.00	1.57
*3. Apply and hold bicycle foot brakes in order to stop completely.	2.05	.84
*4. Stand up from a crouching position while holding a 70 lb. package.	5.55	1.05
5. Hold brake pedal down on half-ton truck traveling at 40 mph in order to come to a complete stop.	3.31	1.46
6. Walk a few steps on flat terrain carrying a 30 lb. back pack.	2.50	.80
*7. Walk a few steps on flat terrain carrying a 50 lb. back pack.	3.36	1.09
8. Stand up from a crouching position while holding a 50 lb. package.	4.59	1.18
9. Stand on a plank leading into a moving van with a 50 lb. chair on your back.	4.41	1.05
10. Stand up from a crouching position while holding a 10 lb. package.	2.09	.92
11. Walk a few steps on flat terrain carrying a 70 lb. back pack.	4.36	1.29
12. Stand up from a crouching position while holding a 70 lb. package.	5.38	1.12
13. Stand on a plank leading into a moving van with a 10 lb. chair on your back.	2.05	1.05
14. Stand up from a crouching position while holding a 30 lb. package.	3.22	.92
15. Crouch to weld a pipe.	1.82	1.05
16. Stand on a plank leading into a moving van with a 30 lb. chair on your back.	3.13	.99
17. Stand at a street corner waiting for the light to change.	1.00	.00
18. Stand at attention.	1.67	1.53
19. Stand while riding a subway for 15 minutes.	2.09	.97
20. Hang wash on a line.	1.59	.85
21. Clip grass around the edge of a 50' x 50' yard in a crouched position.	3.91	1.72

*Anchors selected for scales.

Results for Upper Body Dynamic Strength Anchors

Anchors	Mean	Standard Deviation
1. Load cement from bags into a mixer during an 8-hour shift.	6.27	.94
*2. Dig a 50 ft. trench in clay soil.	6.45	1.06
3. Wind electrical wire around small spools.	2.00	1.02
4. Type a 20 page paper with an electrical typewriter at 40 wpm.	2.86	1.73
5. Lift up a toyota with a jack.	3.27	1.32
6. Iron clothes for a family of four.	3.27	1.35
7. Load 200 lbs. of coal with a shovel.	5.27	1.48
8. Crank a generator with both arms.	4.41	1.37
9. Paint a 20' x 20' ceiling in a house.	4.45	1.41
10. Hang wallpaper in three bedrooms.	4.45	1.34
11. Pull oneself over a 7 ft. wall.	4.14	1.59
12. Crank up a gallon bucket of water from a 20 ft. well.	3.41	1.10
13. Use a pick to break up earth in a 10' x 10' garden.	4.50	1.14
14. Do 25 pullups.	5.68	1.64
15. Staple 400 booklets with a manual stapler.	3.41	1.76
16. Wax and polish the roof of a car.	3.05	1.29
17. Do three pullups.	2.50	1.47
18. Wash 10 small windows.	2.36	1.05
19. Paint a picture with water colors.	1.76	.89
20. Shine shoes all day.	3.45	1.53
21. Saw by hand a 2" by 4" piece of oak.	2.86	.89
22. Shovel snow for 30 minutes.	4.45	1.41
23. Swing down from a tree.	2.33	1.28
*24. Lower one's self down into a manhole.	3.10	1.30
25. Hang from a bar to view wiring of an elevator.	4.14	1.78
26. Pull one's self through a drainage pipe.	3.95	1.56
*27. Use a broom to sweep floor.	1.89	1.15
28. Pull 150 lb. victim across ledge using a rope.	5.41	1.37
29. Climb a 50 ft. mountain cliff using rope, hammer, and pitons.	5.85	1.20

*Anchors selected for scales.

Results for Lower Body Dynamic Strength Anchors

Anchors	Mean	Standard Deviation
*1. Climb a 20 ft. ladder.	2.18	.79
2. Carry a 10 lb. box to a table 25 ft. away.	1.86	.77
*3. Climb mountain (elevation 6,000 ft.).	5.93	1.23
4. Carry a 30 lb. box to a table 25 ft. away.	3.00	.93
5. Operate the clutch pedal of a pickup truck during a 500 mile trip.	3.50	1.47
6. Cut a one-acre lawn with a hand mower.	4.05	1.62
*7. Pedal a bicycle on a flat road for one hour.	3.82	1.01
8. Walk up two flights of stairs in a house.	2.41	1.14
9. Carry a 90 lb. box to a table 25 ft. away.	4.55	1.44
10. Pedal a portable generator with one's feet.	4.00	1.45
11. Pedal a 3-speed bicycle up a 1/2 mile steep grade (20%).	4.82	1.44
12. Push a wheelbarrow full of earth for 1/4 mile.	4.55	1.62
13. Carry a 50 lb. box to a table 25 ft. away.	3.73	1.28
14. Dance the waltz.	2.27	1.35
15. Carry a 70 lb. box to a table 25 ft. away.	4.41	1.26
16. Perform in a ballet.	5.60	1.47
17. Do 30 deep-knee bends.	4.41	1.33
18. Stand up on your toes in order to reach up and lower 20 small packages.	3.36	1.40
19. Do two deep-knee bends.	1.64	1.00
20. Walk uphill with a fire hose.	3.91	1.27
21. Walk two miles over flat terrain.	3.00	1.02
22. Ice skate for an entire afternoon.	4.91	1.66
23. Jog 50 yards.	2.77	1.31
24. Run 2 blocks to catch a bus.	3.27	.94
25. Crawl along the ground in pursuit of a suspect.	3.10	1.31
26. Walk over uneven ground while carrying surveying equipment.	3.95	1.40
27. Climb an extension ladder.	2.90	1.26
28. Deliver the mail on foot for an hour.	2.91	1.22

*Anchors selected for scales.

Results for Upper Body Explosive Strength Anchors

Anchors	Mean	Standard Deviation
1. Hoe a 20' by 20' garden.	3.81	1.44
*2. Split a log with a sledge hammer and wedge.	5.09	1.27
3. Push a shopping cart.	1.48	.75
*4. Throw a 50 lb. bag of garbage into a truck.	4.05	1.26
5. Jerk a 30 lb. anchor loose from the bottom of a lake.	4.00	1.38
6. Plane a 10 ft. board made of oak.	3.09	1.31
7. Turn on a light switch.	1.00	.00
8. Beat a carpet to remove the dust.	2.86	1.28
9. Punch a bag of sand.	2.91	1.19
*10. Hit a nail with a hammer.	2.05	1.09
11. Throw a rope up and over a 30 ft. high tree limb.	3.55	1.68
12. Throw a javelin to win a college meet.	5.77	1.51
13. Push open a stuck window.	4.36	1.62
14. Throw a discus 50 ft.	5.27	1.28
15. Shoot a basketball from 20 ft.	3.55	1.44
16. Strike a match.	1.19	.87
17. Open a new bottle of ketchup.	2.50	1.57
18. Serve a volley ball.	2.36	1.22
19. Throw a baseball.	2.95	1.68
20. Bend a paper clip.	1.43	.98
21. Serve a tennis ball at 80 miles per hour.	5.04	1.56
22. Hit a baseball to left field.	4.50	1.74
23. Throw bags of cement into truck.	5.82	1.37
24. Spank a naughty child.	2.31	1.21
25. Pull off a paint can lid.	2.45	1.56
26. Push back a typewriter carriage.	1.41	.91
27. Hoist a piano using rope and a pulley.	6.09	1.38
28. Drive a golf ball 200 yards.	4.86	1.49
29. Rip up tile.	4.05	1.68

*Anchors selected for scales.

<u> Anchors </u>	<u>Mean</u>	<u>Standard Deviation</u>
30. Sort mail.	1.32	.57
31. Throw a piece of paper in the trash can.	1.18	.66
32. Pull automobile accident victim weighing 150 lbs. from a burning car.	5.18	1.47
33. Win the shot-put event in the olympics.	6.73	.94
34. Shape a horseshoe using a hammer and anvil.	5.23	1.41
35. Twist fire hydrant cap.	5.04	1.86
36. Shoot a marble.	1.41	1.05

Results for Lower Body Explosive Strength Anchors

Anchors	Mean	Standard Deviation
1. Push a wheel barrow with a 220 lb. load over a 4-in. curb.	4.86	1.64
2. Jump over a 4-ft. wall.	4.23	1.51
3. Jump off a 3-ft. ledge to the ground below.	2.45	1.30
4. Stamp trash down in a barrel.	2.41	1.10
5. Kick a door open.	2.95	1.40
*6. Jump up onto a 3-ft. high platform.	3.59	1.30
7. Step up over the curb.	1.00	.00
*8. Stomp on a lighted cigar.	1.14	.35
9. Step on brake of a truck traveling 50 mph to stop immediately.	3.95	1.76
10. Depress dimmer switch on floor of a car.	1.23	.53
11. Sprint 10 yards.	4.00	1.80
12. Dive into a pool from a high diving board.	2.67	1.32
13. Jump across a small stream.	2.86	1.21
14. Kick a football 50 yards.	4.86	1.38
15. Play hop scotch.	2.45	1.40
16. Jump rope.	3.27	1.16
17. Slam on the brakes of a truck.	4.18	1.62
18. Jump over a 6 foot wide hole.	4.41	1.53
19. Jump onto a garbage truck.	3.32	1.49
20. Jump off boat to dock.	2.45	.96
*21. Run 100 yards in 10 seconds.	6.00	1.38
22. Kick-start a motorcycle.	3.54	1.50
23. Jump up from a chair.	2.32	1.43
24. Dash from file cabinet to ringing phone on desk.	2.45	1.22
25. Jump across rooftop from a burning building.	4.95	1.68
26. Kick dents out of a fender.	4.68	1.73

*Anchors selected for scales.

APPENDIX E. SCALES FOR STRENGTH, STAMINA, EFFORT, CRITICALITY AND TEAM WORK

1. UPPER BODY STATIC STRENGTH

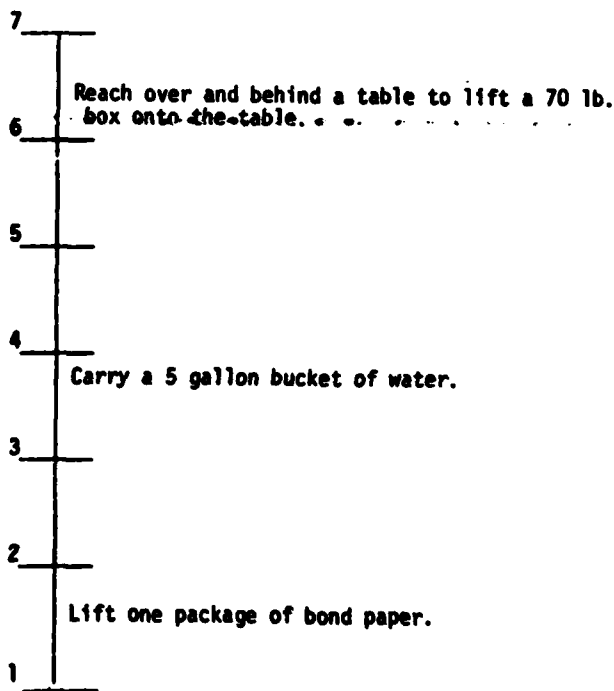
This is the ability to use muscle force in the upper part of the body (i.e., above the waist) in order to lift, push or pull objects. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW UPPER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without <u>stopping</u> , up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (5): Does involve physical exertion over a long time.

1. UPPER BODY STATIC STRENGTH

Requires use of maximum muscle force above the waist necessary to lift, push or pull very heavy objects.



Requires use of little muscle force above the waist necessary to lift, push or pull light objects.

2. LOWER BODY STATIC STRENGTH

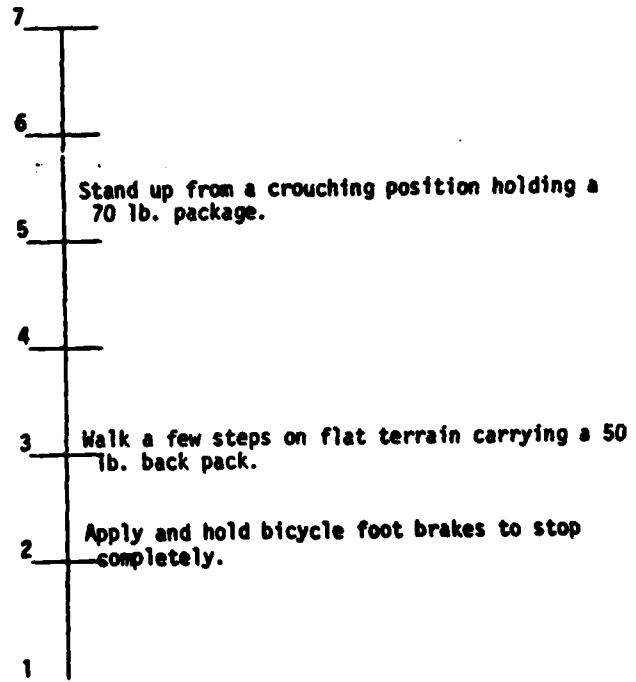
This is the ability to use muscle force in the lower part of the body (i.e., below the waist) in order to lift, carry, push or pull objects. This ability can involve a combination of muscles located in the feet, legs, and lower back.

HOW LOWER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without stopping, up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel <u>some</u> object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (5): <u>Does</u> involve physical exertion over a long time.

2. LOWER BODY STATIC STRENGTH

Requires use of maximum muscle force below the waist necessary to lift, carry, push or pull a very heavy object.



Requires use of a little muscle force below the waist necessary to lift, carry, push or pull a light object.

3. UPPER BODY DYNAMIC STRENGTH

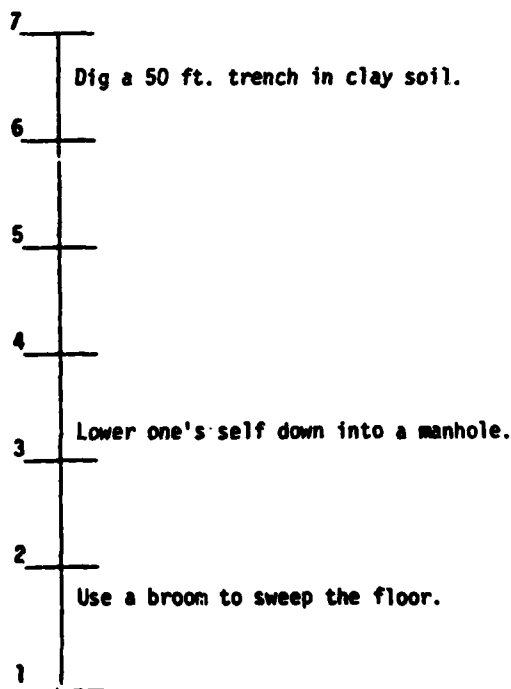
This ability involves the degree to which the muscles in the upper part of the body (i.e., above the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the hands, arms, upper back and shoulders.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's <u>body weight</u> or objects repeatedly.	vs.	Static Strength (1): Exert force against objects.
Use one's muscles to <u>continue to hold up or move one's body weight</u> or an object.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel the body or an object.
Hold up one's <u>entire</u> body weight with hands and arms.	vs.	Trunk Strength (4): Hold up or move <u>part</u> , not all, of your body, using mainly stomach and lower back muscles.
Involves the degree to which the specific <u>muscles do not give out</u> .	vs.	Stamina (5): Involves the degree to which one <u>does not get winded during physical exertion</u> .

3. UPPER BODY DYNAMIC STRENGTH

Requires use of maximum muscle force above the waist necessary to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force above the waist to hold up or move the body weight or objects for a short time.

4. LOWER BODY DYNAMIC STRENGTH

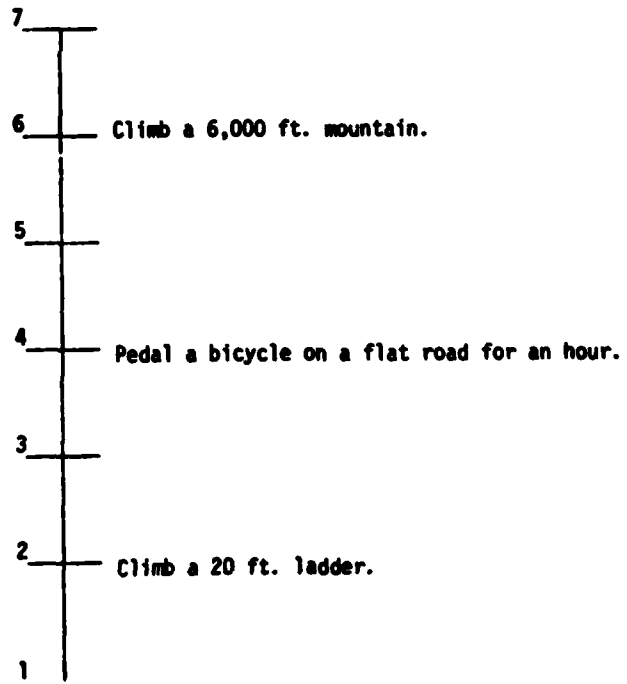
This ability involves the degree to which the muscles in the lower part of the body (i.e., below the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the feet or legs.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's <u>body weight</u> or objects repeatedly.	vs.	Static Strength (1): Exert force <u>against</u> objects.
Use one's muscles to <u>continue to hold up or move</u> one's body weight or an object.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel the body or an object.
Hold up or move one's <u>entire</u> body weight with feet and legs.	vs.	Trunk Strength (4): Hold up or move <u>part</u> , not all, of your body, using mainly stomach and lower back muscles.
Involves the degree to which the specific <u>muscles</u> do not <u>give out</u> .	vs.	Stamina (5): Involves the degree to which one <u>does not get winded</u> during physical exertion.

4. LOWER BODY DYNAMIC STRENGTH

Requires use of all maximum muscle force below the waist to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force below the waist to hold up or move the body weight or objects for a short time

5. UPPER BODY EXPLOSIVE STRENGTH

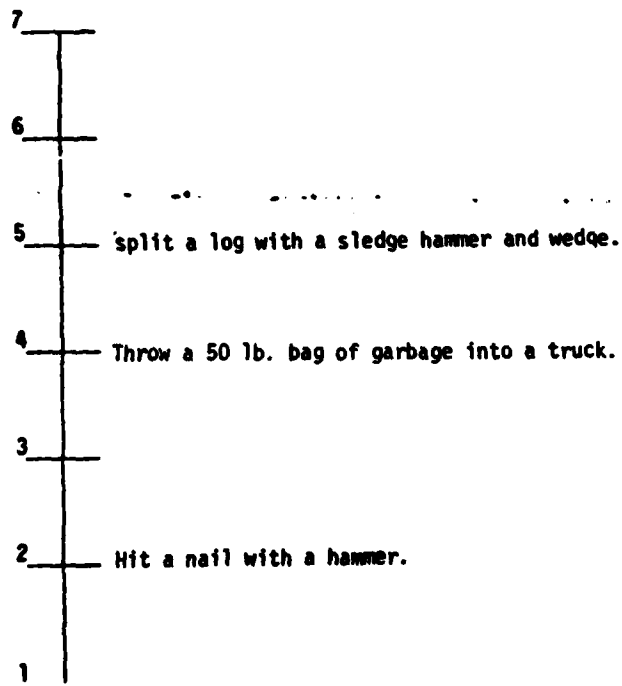
This is the ability to use short bursts of muscle force in the upper part of the body (i.e., above the waist) to propel one's self, as in throwing objects. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use short bursts of muscle force to <u>move</u> the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles.
Does <u>not</u> involve use of muscle force over a long time	vs.	Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move <u>one's entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
	vs.	Stamina (5): <u>Does</u> involve physical exertion over a long period of time.

5. UPPER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force above the waist to propel one's own body weight or objects.



Requires bursts of a little muscle force above the waist to move one's own body weight or objects.

6. LOWER BODY EXPLOSIVE STRENGTH

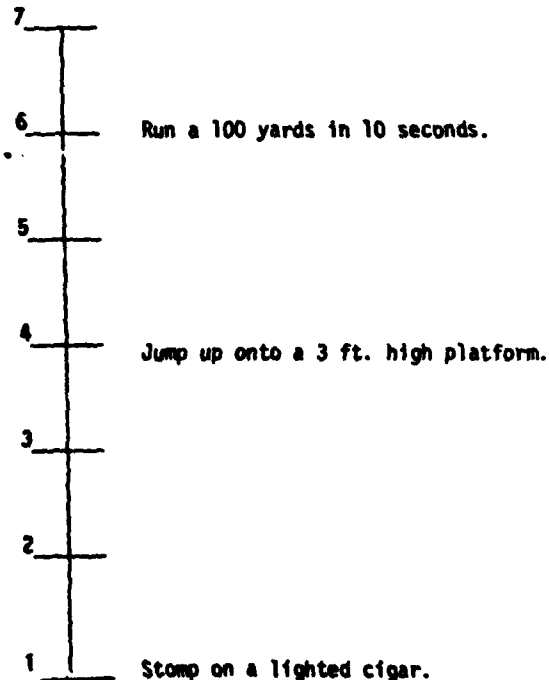
This is the ability to use short bursts of muscle force in the lower part of the body (i.e., below the waist) to propel one's self, as in jumping or sprinting. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the feet and legs.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use <u>short bursts</u> of muscle force to move the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles.
Does <u>not</u> involve use of muscle force over a long time	vs.	Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
		Stamina (5): Does involve physical exertion over a long period of time.

6. LOWER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force below the waist necessary to propel one's own body weight or objects.



Requires bursts of a little muscle force below the waist to move one's own body weight or objects.

7. TRUNK STRENGTH

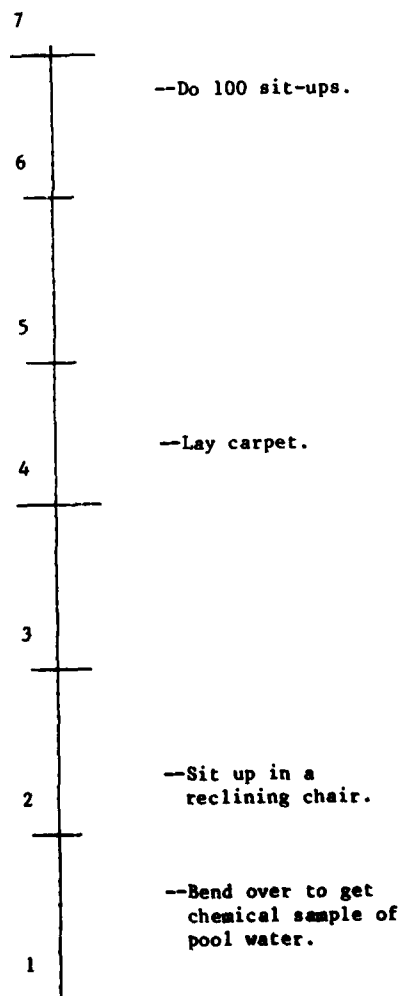
This ability involves the degree to which one's stomach and lower back muscles can support part of the body repeatedly or continuously over time. The ability involves the degree to which these trunk muscles do not "give out," or fatigue, when they are put under such repeated or continuous strain.

HOW TRUNK STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move <u>part</u> , not all, of one's body, using stomach and lower back muscles.	vs.	Dynamic Strength (3): Hold up or move one's <u>entire</u> body weight with the arms and shoulder muscles.
Hold up or move part of one's <u>body weight</u> .	vs.	Static Strength (1): Move <u>objects</u> .
Use your stomach and back muscles to <u>continue to hold up or move</u> part of one's body.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel one's body or an object.
Involves the degree to which the <u>specific stomach and back muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one <u>does not get winded</u> during physical exertion.

7. TRUNK STRENGTH

Requires use of all the stomach and lower back muscle force possible to hold up or move part of your body for as long as possible.



Requires use of a little stomach and lower back muscle force to hold up or move part of your body for a short time.

8. STAMINA

This is the ability to exert oneself physically over a period of time without getting winded or out of breath.

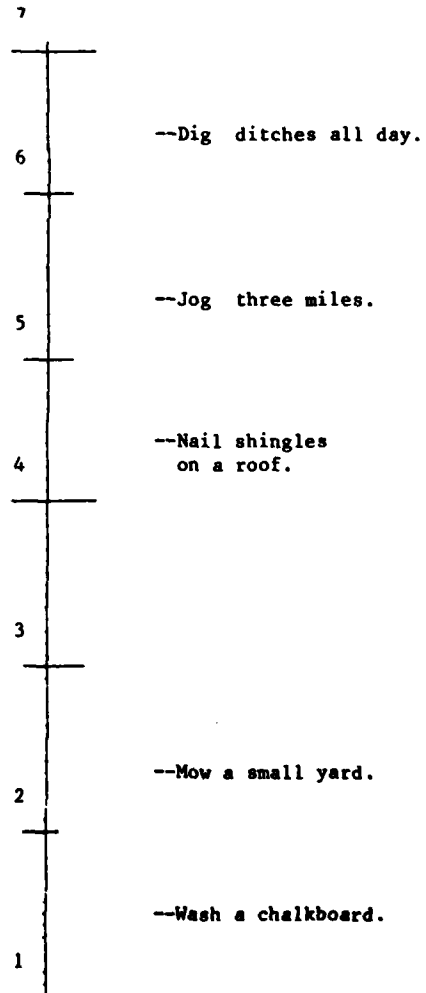
HOW STAMINA IS DIFFERENT FROM OTHER ABILITIES:

Does involve physical exertion over a long time.	vs.	Static Strength (1) and Explosive Strength (2): Do <u>not</u> involve using muscle force over a long time.
Involves not getting <u>winded</u> .	vs.	Dynamic Strength (3) and Trunk Strength (4): Involves one's <u>muscles</u> not getting tired.

8. STAMINA

Requires physical activity of the whole body over a long time, with great strain on the heart and blood vessels.

Requires physical activity of the whole body over a short time with little strain on the heart and blood vessels.



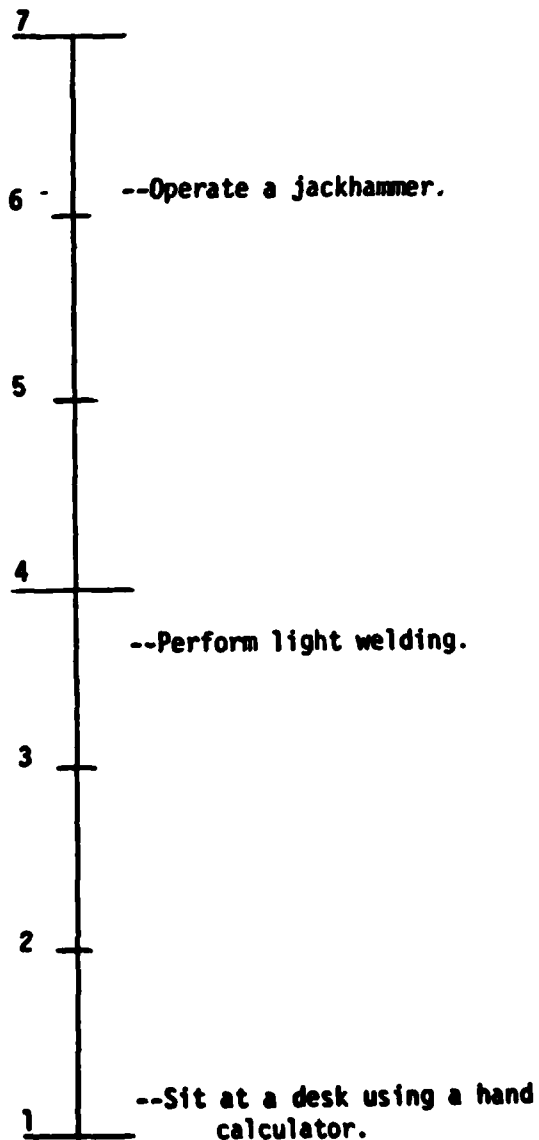
9. EFFORT

This is the degree of physical exertion experienced in performing either a single task or a series of tasks.

9. EFFORT

Requires extensive
physical exertion.

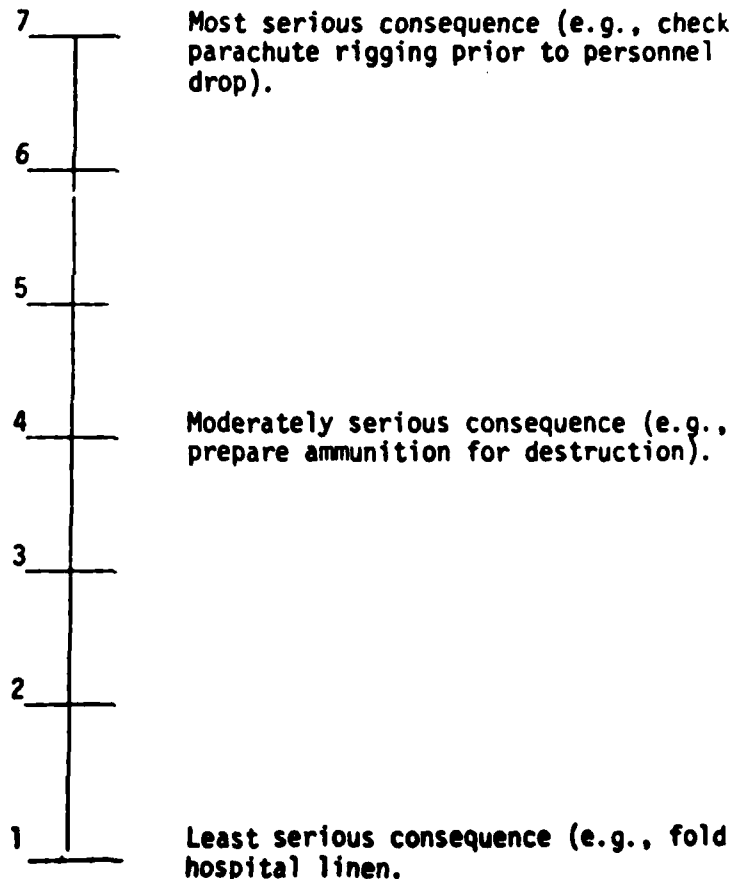
Requires little
physical exertion.



10. CONSEQUENCES OF INADEQUATE PERFORMANCE

This scale is a measure of the seriousness of probable consequences of inadequate performance of a job. It is defined in terms of possible injury or death, wasted supplies, damaged equipment, and wasted man-hours of work. The work is to be rated on a scale from 1 (Least Serious Consequences of Inadequate Performance) to 7 (Most Serious Consequences of Inadequate Performance) with intermediate levels defined as follows:

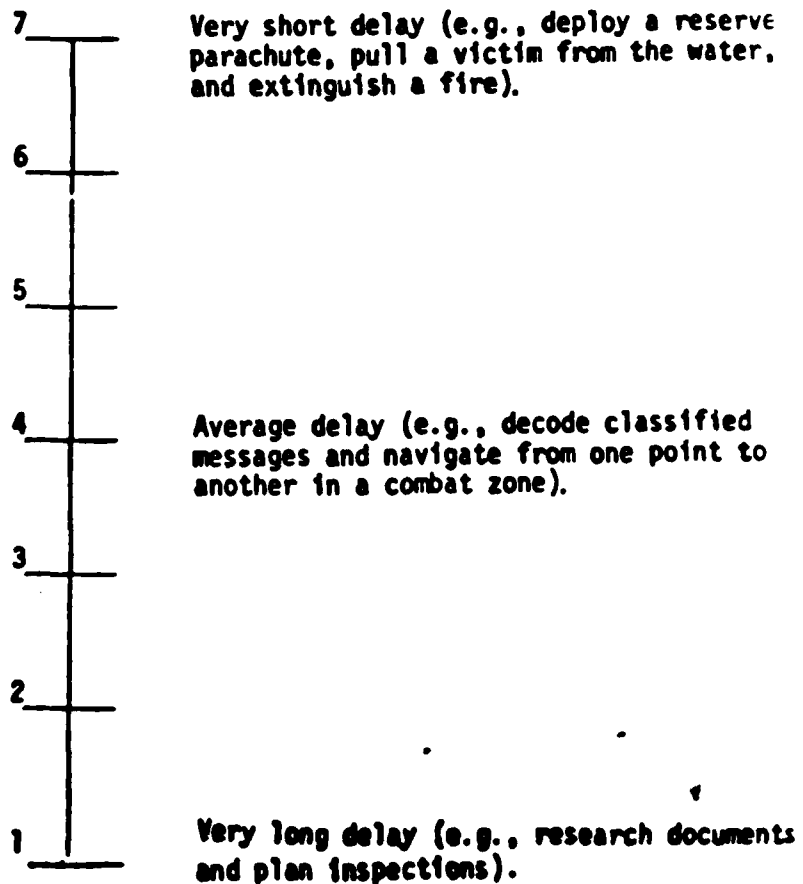
What will happen if the job is inadequately performed?



11. DELAY TOLERANCE

This scale is a measure of how much delay work performance can be tolerated between the time the soldier becomes aware that the work must be performed and the time he must begin doing it. Must the soldier begin immediately, or does he have time to consult a manual, seek guidance, or even be taught to do it? The work is to be rated on a scale from 1 (Very Long Delay Tolerance) to 7 (Very Short Delay Tolerance) with intermediate levels defined as follows:

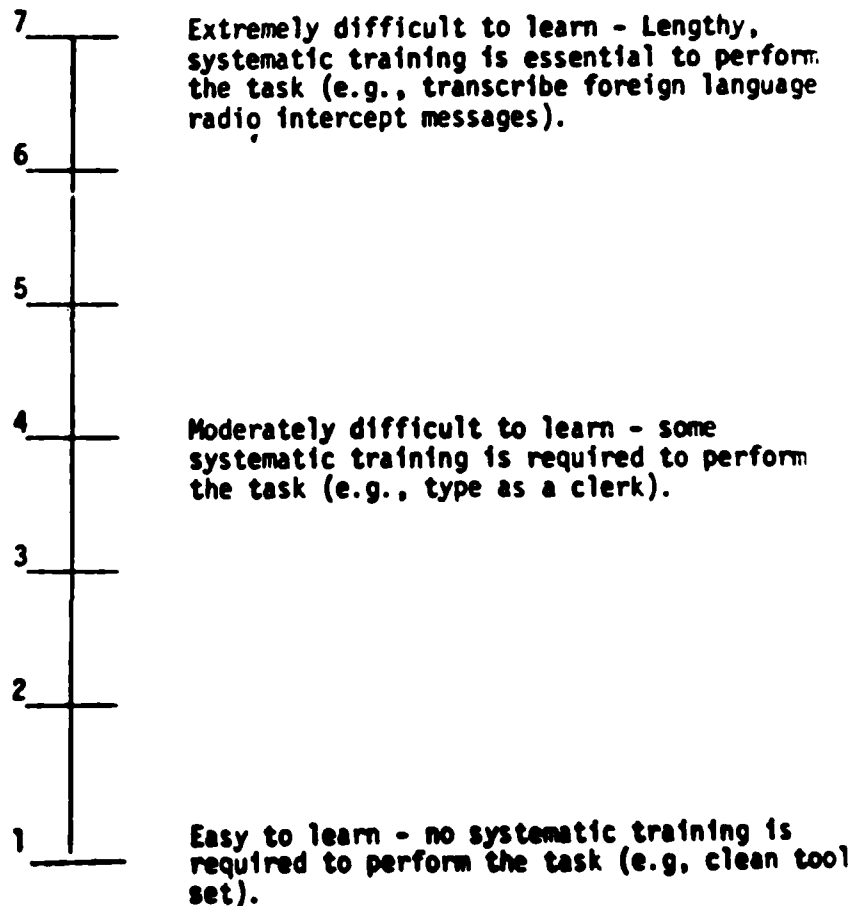
How much delay before performing
the job is acceptable?



12. LEARNING DIFFICULTY

This scale is a measure of the need for lengthy, systematic training before a new member of the appropriate Army specialty could perform the job adequately. It may be thought of as the difficulty involved in "picking up" the job. The work is to be rated on a scale from 1 (Easy to Learn) to 7 (Extremely Difficult to Learn) with intermediate levels defined as follows:

How difficult is the job to learn?



13. TEAM WORK

Of the total number of times you did this job during the past year, what percentage of the time did you perform the work in a team? A team is where two or more persons contribute together to successful completion of the job. Use the following seven-point scale to do the ratings.

Always performed as a team

7

100% of the time

6

90% of the time

5

70% of the time

4

50% of the time

3

30% of the time

2

10% of the time

1

Never performed in a team

0% of the time

APPENDIX F, PHYSICAL ABILITIES ANALYSIS MANUAL FOR ARMY JOBS

INTRODUCTION

Physical Abilities Analysis is a method to evaluate the physical demands of jobs. Every job is made up of a group of tasks that must be completed effectively for the worker to exhibit successful job performance. Different jobs are made up of different tasks and require different abilities for effective performance. The abilities that we will consider are the physical traits of the worker that produce successful performance of the different tasks that make up the job.

Physical Ability Analysis describes the physical abilities needed to do the physical part of a job. This manual contains eight rating scales that pertain to one's physical abilities. These eight physical abilities include Upper and Lower Body Static, Dynamic, Explosive, and Trunk Strength and Stamina. The effort scale is included to provide an overall estimate of the physical exertion experienced in performing either a task or a job. The manual also contains three measures of criticality (i.e., consequences of inadequate performance, delay tolerance, and learning difficulty).

Each scale consists of seven points. The number "7" at the top of the scale is the greatest amount of physical ability and effort as well as the highest criticality any job could have. The number "1" at the bottom is the lowest amount of physical ability, effort, and criticality any job could have. Number "4" on the scale is an average or moderate amount.

The manual is separated into two parts. In Part I you will use the 12 scales to indicate two things about your job: the amount of physical abilities and effort required by the job, and the criticality of the job. In Part II, you will use the same 12 scales to indicate the amount of physical abilities and criticality for a series of tasks that make up your job. In other words, you will rate each task on each of the 12 scales.

More detailed and explicit instructions are provided at the beginning of each part of the manual.

Before continuing, please complete the following background information.

Background Information

1. Name _____
2. Social Security Number _____ 1: 2-10
3. What Year were You Born? _____ 1: 11-14
4. What is your sex? _____
 1. Female 1: 15
 2. Male
5. What is your race? _____
 1. White 1:16
 2. Black
 3. Malayan
 4. Oriental
 5. Hispanic
 6. Other
6. Your Grade? (e.g., E-5) _____ 1:17
7. What is your MOS? (e.g., 12B) _____ 1:18-19
8. What is your skill Level? (e.g., 3) _____ 1:20
9. How long have you been assigned to your present MOS? _____ years 1:21-22
10. How long have you been in the Army? _____ years 1:23-24

PART I

Ratings of Overall Job Requirements

Instructions

To use the Physical Abilities Analysis Manual you must be familiar with the definition of each ability. These abilities are defined and examples are given to tell you what the ability is and how it differs from other similar abilities. For example, to familiarize yourself with the manual turn the page and read the definition and comparison information for the first ability, Upper Body Static Strength. After you have finished reading the definition and comparisons, and feel you really understand it, you are ready to begin analyzing the job.

Next, think about the job you are describing. Do you think Upper Body Static Strength is needed or not needed to do this job? If it is not needed, place a zero in the appropriate space and proceed on to the next physical ability.

If, however, you think that the ability, Upper Body Static Strength is required to do the job, then you need to decide how much strength is needed and rate this according to the scale located below the definition and comparisons on the next page. The numbers 1 to 7 represent the amount of Upper Body Static Strength is required to perform the job. The number "7" at the top of the scale indicates the greatest amount of Upper Body Static Strength that any job could require. The number "1" at the bottom represents the lowest amount of Upper Body Static Strength any job could require. Number "4" is an average amount of Upper Body Static Strength. Examples of tasks that need different amounts of the ability are on the right-hand side of the scale. These examples are there to help you decide how much of the ability is needed to do the job you are describing. For example, "Reach over and behind a table to lift a 70 lb. box onto a table," is a task that requires a great deal of Upper Body Static Strength. If the job you are describing usually requires even more Upper Body Static Strength than this, it would be somewhere nearer to the "7" at the top of the scale. "Lift one package of bonded paper," requires very little Upper Body Static Strength. If the

job you are describing requires even less Upper Body Static Strength than this, it would be somewhere nearer to the "1" at the bottom of the scale. "Carry a 5 gallon bucket of water," requires more Upper Body Static Strength than "Lifting a package of bond paper," and much less than "Reach over and behind a table to lift a 70 lb. box onto a table."

Next, how do you decide how much Upper Body Static Strength is needed to do the job? Consider these steps:

First, think about what the worker does on the job you are describing that needs this ability.

Second, use the examples to the right of the scale by asking the questions, "Does the worker need more, just about the same, or less of the ability than this example?"

Some words of caution:

- (1) Assume the worker is trained and experienced.
- (2) Do not overrate the amount of Upper Body Static Strength required to do the job. It is often the case that people involved with a job assume it is more demanding than it really is.
- (3) If the worker performs a task requiring a great deal of Upper Body Static Strength frequently, it should be rated high.
- (4) If a worker performs a task requiring a great deal of Upper Body Static Strength infrequently but the task is important to the job, it should be rated high.

Choose a number on the scale from 7 to 1 that you think is the amount of the ability needed to do the job and place it in the box provided. We will then proceed through the remaining 7 physical abilities. The three criticality and the effort scales will be

completed in the same way, using the 7 point scale. Definitions for these scales are provided. Once you have read them, perform the ratings.

If you have any questions up to this point, please ask the administrator. If not, you may begin rating Upper Body Static Strength. Please stop when you have completed rating the job for each ability and wait for further instructions from the administrator about the next ability to be rated. We will go through the manual step by step as a group.

1. UPPER BODY STATIC STRENGTH

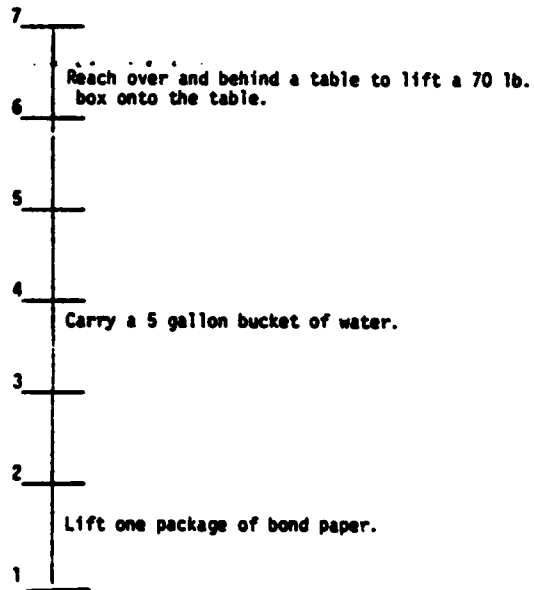
This is the ability to use muscle force in the upper part of the body (i.e., above the waist) in order to lift, push or pull objects. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW UPPER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move <u>part</u> , not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without <u>stopping</u> , up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (5): Does involve physical exertion over a long time.

1. UPPER BODY STATIC STRENGTH

Requires use of maximum muscle force above the waist necessary to lift, push or pull very heavy objects.



Requires use of little muscle force above the waist necessary to lift, push or pull light objects.

Using the 7-point scale please rate how much Upper Body Static Strength it takes to do the job. Place appropriate number on the line.

()
1:25

2. LOWER BODY STATIC STRENGTH

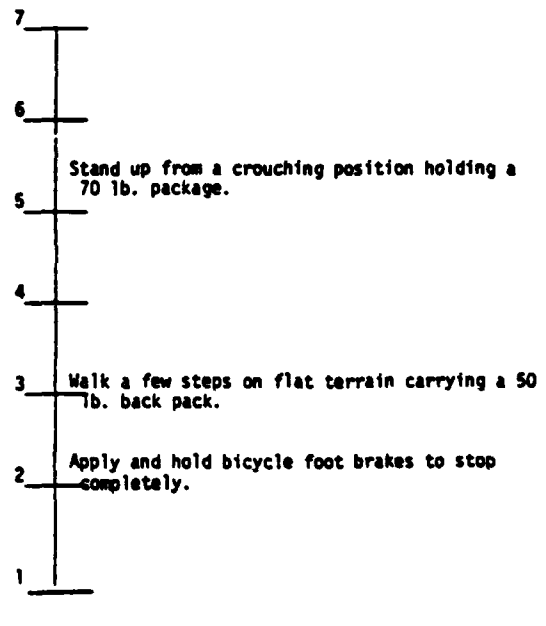
This is the ability to use muscle force in the lower part of the body (i.e., below the waist) in order to lift, carry, push or pull objects. This ability can involve a combination of muscles located in the feet, legs, and lower back.

HOW LOWER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without stopping, up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (5): Does involve physical exertion over a long time.

2. LOWER BODY STATIC STRENGTH

Requires use of maximum muscle force below the waist necessary to lift, carry, push or pull a very heavy object.



Using the 7-point scale please rate how much Lower Body Static Strength it takes to do the job. Place appropriate number on the line, ()

1:26

3. UPPER BODY DYNAMIC STRENGTH

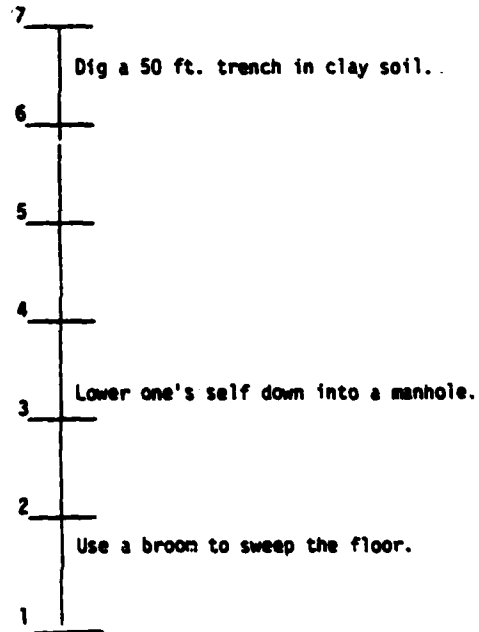
This ability involves the degree to which the muscles in the upper part of the body (i.e., above the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the hands, arms, upper back and shoulders.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's <u>body weight</u> or objects repeatedly.	vs.	Static Strength (1): Exert force against objects.
Use one's muscles to <u>continue to hold up or move</u> one's body weight or an object.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel the body or an object.
Hold up one's <u>entire</u> body weight with hands and arms.	vs.	Trunk Strength (4): Hold up or move <u>part</u> , not all, of your body, using mainly stomach and lower back muscles.
Involves the degree to which the specific <u>muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one does not <u>get winded</u> during physical exertion.

3. UPPER BODY DYNAMIC STRENGTH

Requires use of maximum muscle force above the waist necessary to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force above the waist to hold up or move the body weight or objects for a short time.

Using the 7-point scale please rate how much Upper Body Dynamic Strength it takes to do the job. Place appropriate number on the line. ()

1:27

4. LOWER BODY DYNAMIC STRENGTH

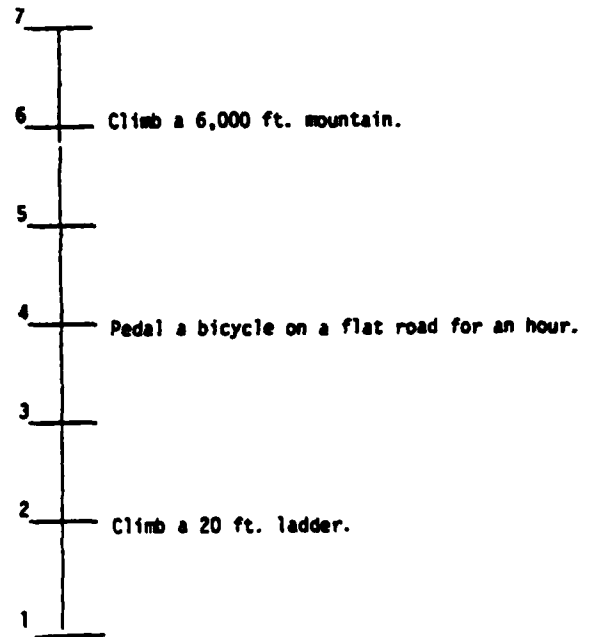
This ability involves the degree to which the muscles in the lower part of the body (i.e., below the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the feet or legs.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's body <u>weight</u> or objects repeatedly.	vs.	Static Strength (1): Exert force against objects.
Use one's muscles to <u>continue</u> to hold up or <u>move</u> one's body weight or an object.	vs.	Explosive Strength (2): Use <u>short</u> bursts of muscle force to propel the body or an object.
Hold up or move one's <u>entire</u> body weight with feet and legs.	vs.	Trunk Strength (4): Hold up or move <u>part</u> , not all, of your body, using <u>mainly</u> stomach and lower back muscles.
Involves the degree to which the specific <u>muscles</u> do not <u>give out</u> .	vs.	Stamina (5): Involves the degree to which one <u>does not get winded</u> during physical exertion.

4. LOWER BODY DYNAMIC STRENGTH

Requires use of all maximum muscle force below the waist to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force below the waist to hold up or move the body weight or objects for a short time

Using the 7-point scale please rate how much Lower Body Dynamic Strength it takes to do the job. Place appropriate number on the line. ()

1:28

5. UPPER BODY EXPLOSIVE STRENGTH

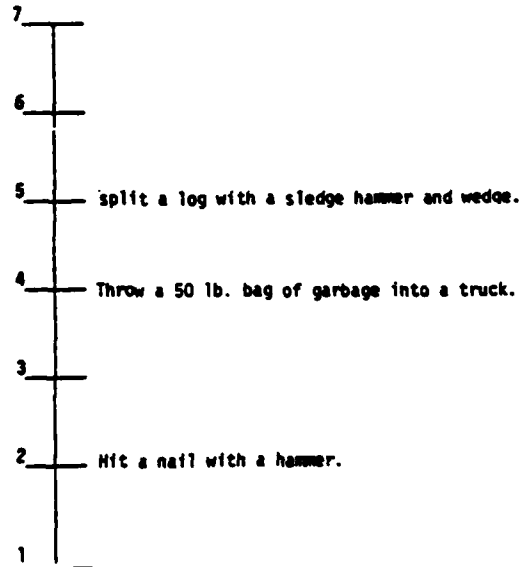
This is the ability to use short bursts of muscle force in the upper part of the body (i.e., above the waist) to propel one's self, as in throwing objects. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use short bursts of muscle force to <u>move</u> the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Does not involve use of muscle force over a long time	vs.	Stamina (5): Does involve physical exertion over a long period of time.

5. UPPER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force above the waist to propel one's own body weight or objects.



Requires bursts of a little muscle force above the waist to move one's own body weight or objects.

Using the 7-point scale please rate how much Upper Body Explosive Strength it takes to do the job. Place appropriate number on the line. ()

1:29

6. LOWER BODY EXPLOSIVE STRENGTH

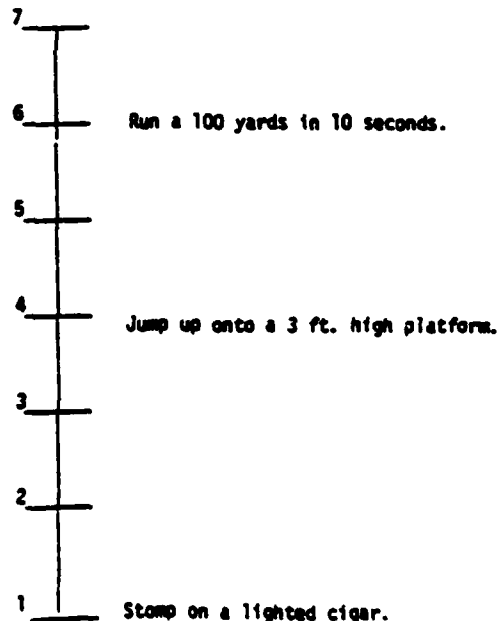
This is the ability to use short bursts of muscle force in the lower part of the body (i.e., below the waist) to propel one's self, as in jumping or sprinting. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the feet and legs.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use <u>short bursts</u> of muscle force to move the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles.
Does <u>not</u> involve use of muscle force over a long time	vs.	Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
		Stamina (5): Does involve physical exertion over a long period of time.

6. LOWER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force below the waist necessary to propel one's own body weight or objects.



Requires bursts of a little muscle force below the waist to move one's own body weight or objects.

Using the 7-point scale please rate how much Lower Body Explosive Strength it takes to do the job. Place appropriate number on the line. ()
1:30

7. TRUNK STRENGTH

This ability involves the degree to which one's stomach and lower back muscles can support part of the body repeatedly or continuously over time. The ability involves the degree to which these trunk muscles do not "give out," or fatigue, when they are put under such repeated or continuous strain.

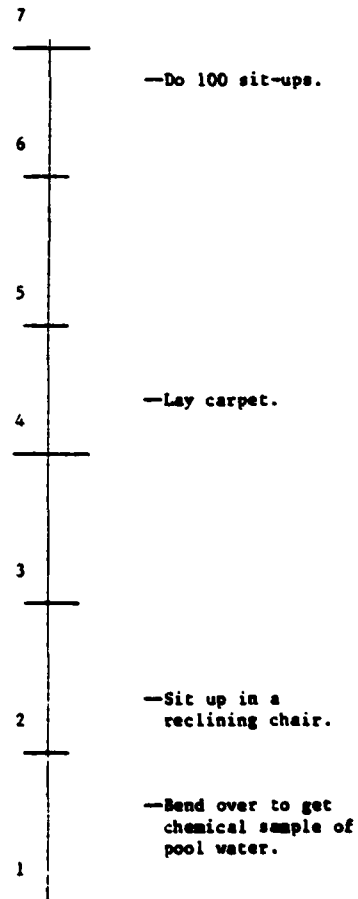
HOW TRUNK STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move <u>part</u> , not all, of one's body, using stomach and lower back muscles.	vs.	Dynamic Strength (3): Hold up or move one's <u>entire</u> body weight with the arms and shoulder muscles.
Hold up or move part of one's <u>body weight</u> .	vs.	Static Strength (1): Move <u>objects</u> .
Use your stomach and back muscles to <u>continue</u> to hold up or move part of one's body.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel one's body or an object.
Involves the degree to which the <u>specific stomach and back muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one <u>does not get winded</u> during physical exertion.

7. TRUNK STRENGTH

Requires use of all the stomach and lower back muscle force possible to hold up or move part of your body for as long as possible.

Requires use of a little stomach and lower back muscle force to hold up or move part of your body for a short time.



Using the 7-point scale please rate how much Trunk Strength it takes to do the job. Place appropriate number on the line

1:31

8. STAMINA

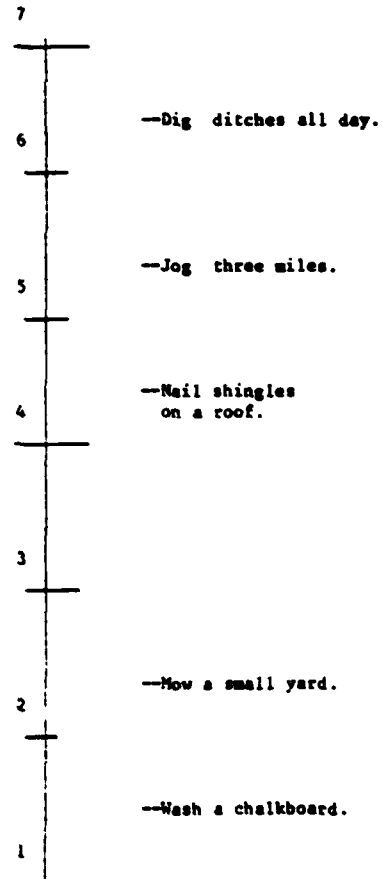
This is the ability to exert oneself physically over a period of time without getting winded or out of breath.

HOW STAMINA IS DIFFERENT FROM OTHER ABILITIES:

Does involve physical exertion over a long time.	vs.	Static Strength (1) and Explosive Strength (2): Do <u>not</u> involve using muscle force over a long time.
Involves not getting <u>winded</u> .	vs.	Dynamic Strength (3) and Trunk Strength (4): Involves one's <u>muscles</u> not getting tired.

8. STAMINA

Requires physical activity of the whole body over a long time, with great strain on the heart and blood vessels.



Requires physical activity of the whole body over a short time with little strain on the heart and blood vessels.

Using the 7-point scale please rate how much Stamina it takes to do the job. Place appropriate number on the line.

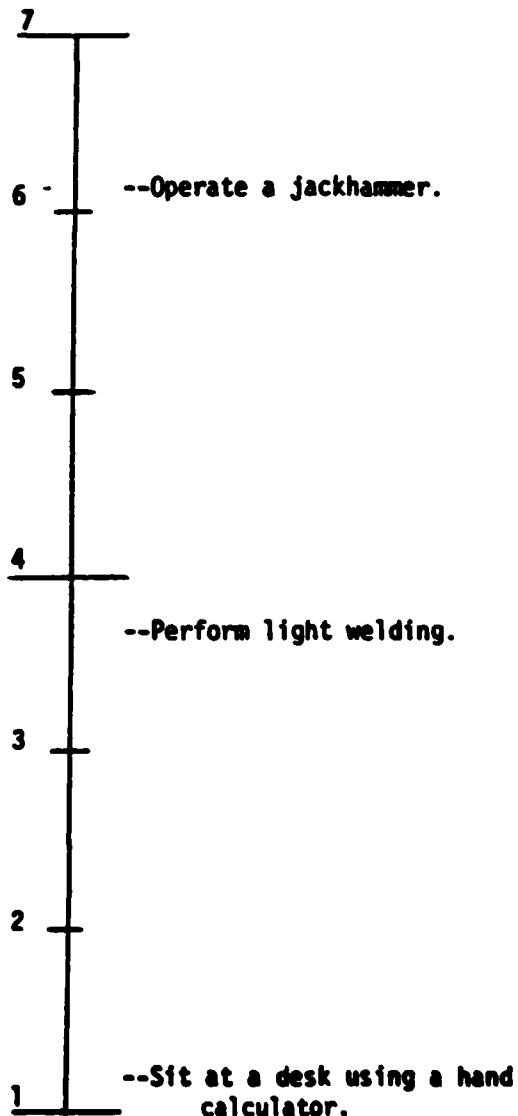
9. EFFORT

This is the degree of physical exertion experienced in performing either a single task or a series of tasks.

9. EFFORT

Requires extensive
physical exertion.

Requires little
physical exertion.



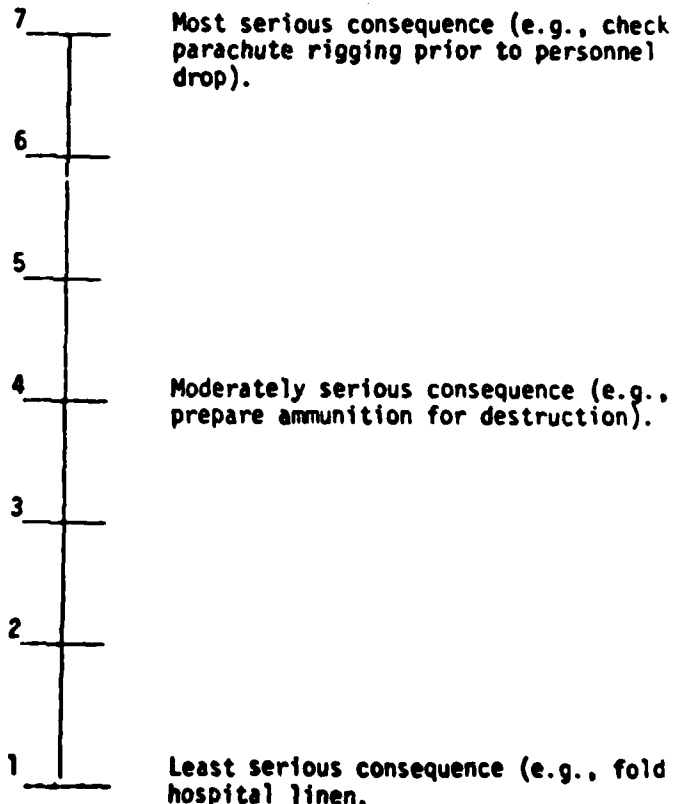
Using the 7-point scale please rate how much Effort it takes to do the job. Place appropriate number on the line.

(_____)

10. CONSEQUENCES OF INADEQUATE PERFORMANCE

This scale is a measure of the seriousness of probable consequences of inadequate performance of a job. It is defined in terms of possible injury or death, wasted supplies, damaged equipment, and wasted man-hours of work. The work is to be rated on a scale from 1 (Least Serious Consequences of Inadequate Performance) to 7 (Most Serious Consequences of Inadequate Performance) with intermediate levels defined as follows:

What will happen if the job is inadequately performed?



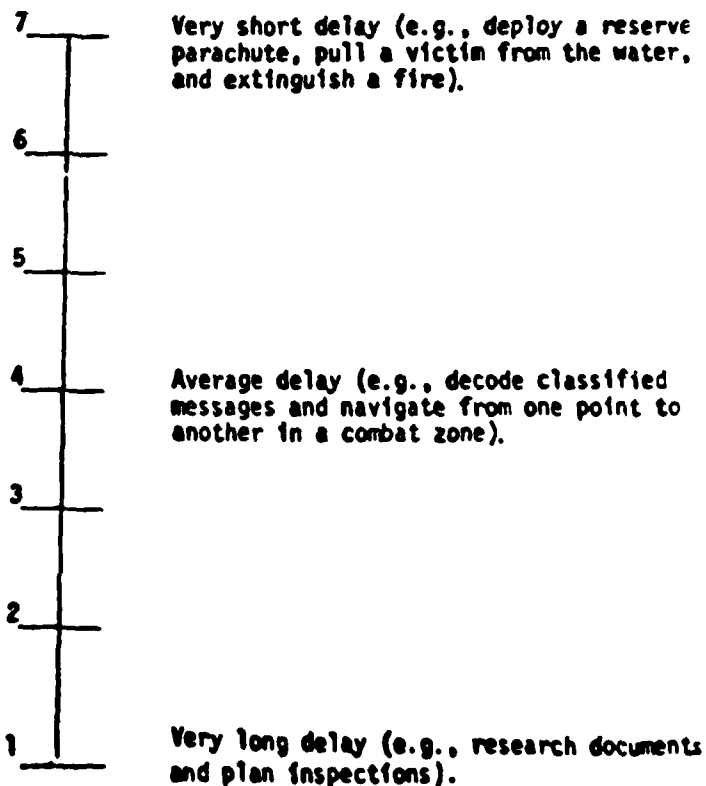
Using the 7-point scale please rate what will happen if the job is inadequately performed. Place appropriate number on the line.

(_____)

11. DELAY TOLERANCE

This scale is a measure of how much delay work performance can be tolerated between the time the soldier becomes aware that the work must be performed and the time he must begin doing it. Must the soldier begin immediately, or does he have time to consult a manual, seek guidance, or even be taught to do it? The work is to be rated on a scale from 1 (Very Long Delay Tolerance) to 7 (Very Short Delay Tolerance) with intermediate levels defined as follows:

How much delay before performing
the job is acceptable?



Using the 7-point scale please rate how much delay before performing the job is acceptable. Place appropriate number on the line.

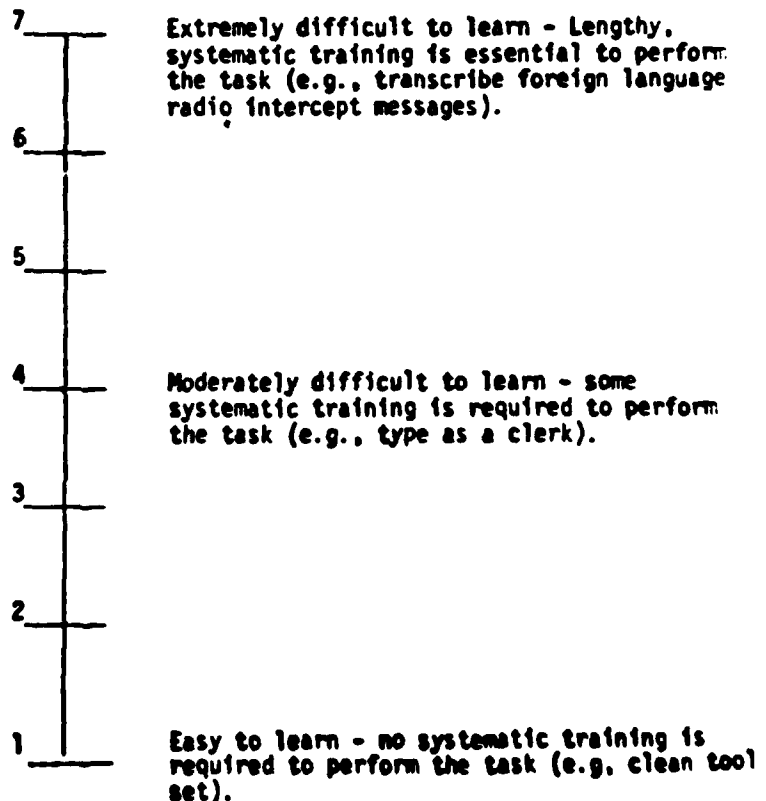
()

1:35

12. LEARNING DIFFICULTY

This scale is a measure of the need for lengthy, systematic training before a new member of the appropriate Army specialty could perform the job adequately. It may be thought of as the difficulty involved in "picking up" the job. The work is to be rated on a scale from 1 (Easy to Learn) to 7 (Extremely Difficult to Learn) with intermediate levels defined as follows:

How difficult is the job to learn?



Using the 7-point scale please rate how difficult it is to learn the job. Place appropriate number on the line. ()

PART II

Rating of Task Requirements

Instructions

Now that you have completed Part I you will be using the same 13 scales to rate physical abilities, criticality, and team performance for a series of tasks in your MOS.

For example, the first scale is again Upper Body Static Strength. Read the first task on the list, and then think about the definition of Upper Body Static Strength. Do you think Upper Body Static Strength is needed or not needed to do this task? If it is not needed place a zero and proceed on to the next task in the list. If, however, you think the ability is required to do the task, then you need to decide how much Upper Body Static Strength is needed. Use the 7 point scale and choose the number you think is the amount of the ability needed to do the task. Place the number on the line next to the task. Please continue through all of the tasks and place the appropriate number on the line next to each task.

When you have rated all of the tasks for Upper Body Static Strength stop and wait for further instructions. We will then proceed as a group in the same fashion through the remaining 11 scales.

If you have any questions, please ask the administrator. If not, you may begin.

1. UPPER BODY STATIC STRENGTH

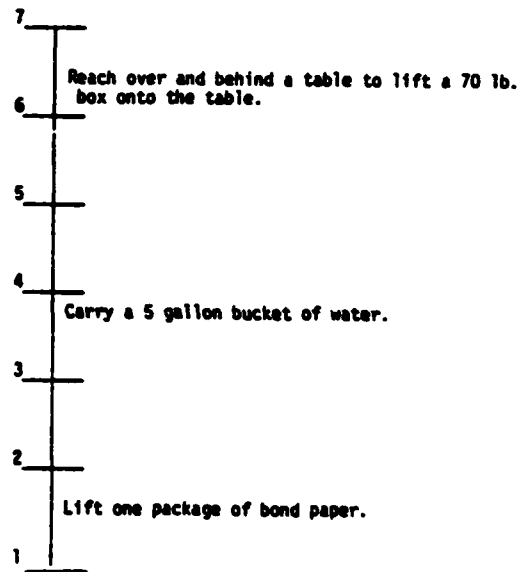
This is the ability to use muscle force in the upper part of the body (i.e., above the waist) in order to lift, push or pull objects. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW UPPER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without stopping, up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does not involve the use of muscle force over a long time.	vs.	Stamina (5): Does involve physical exertion over a long time.

1. UPPER BODY STATIC STRENGTH

Requires use of maximum muscle force above the waist necessary to lift, push or pull very heavy objects.



Requires use of little muscle force above the waist necessary to lift, push or pull light objects.

Using the 7-point scale please rate how much Upper Body Static Strength it takes to perform each of the following tasks on the next page.

TASK LIST

Insert List of Tasks representing the MOS under investigation. Leave space next to each task to allow participants to record their ratings.

The same List of Tasks should be placed after each ability and/or criticality page.

2. LOWER BODY STATIC STRENGTH

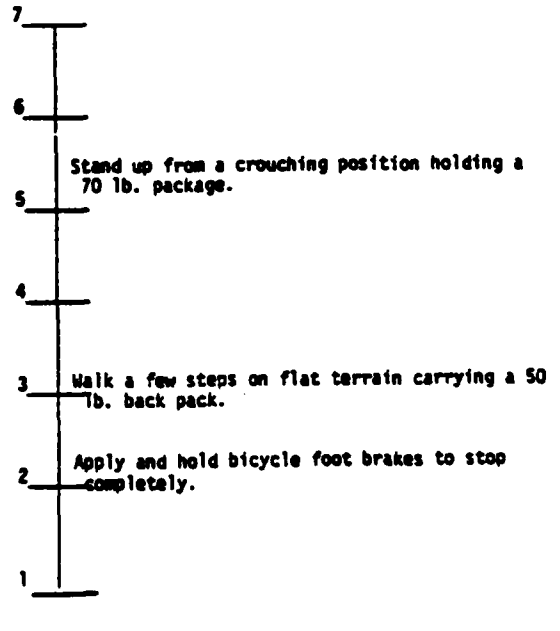
This is the ability to use muscle force in the lower part of the body (i.e., below the waist) in order to lift, carry, push or pull objects. This ability can involve a combination of muscles located in the feet, legs, and lower back.

HOW LOWER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without stopping, up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (5): Does involve physical exertion over a long time.

2. LOWER BODY STATIC STRENGTH

Requires use of maximum muscle force below the waist necessary to lift, carry, push or pull a very heavy object.



Using the 7-point scale please rate how much Lower Body Static Strength it takes to perform each of the following tasks on the next page.

3. UPPER BODY DYNAMIC STRENGTH

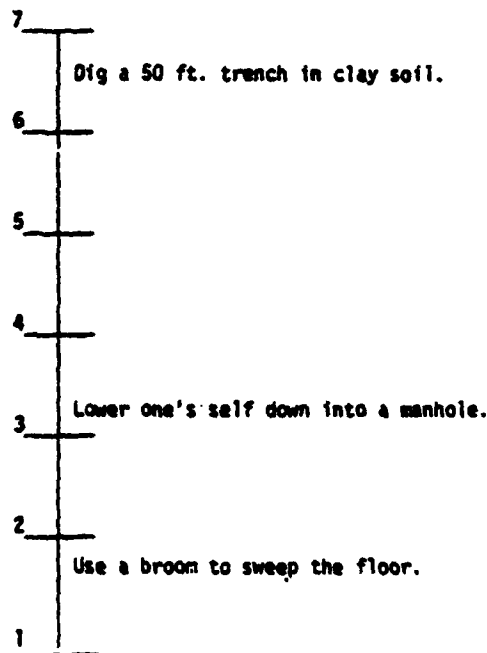
This ability involves the degree to which the muscles in the upper part of the body (i.e., above the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the hands, arms, upper back and shoulders.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's body <u>weight</u> or objects repeatedly.	vs.	Static Strength (1): Exert force against objects.
Use one's muscles to <u>continuous</u> to hold up or move one's body weight or an object.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel the body or an object.
Hold up one's <u>entire</u> body weight with hands and arms.	vs.	Trunk Strength (4): Hold up or move <u>part</u> , not all, of your body, using mainly stomach and lower back muscles.
Involves the degree to which the specific <u>muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one does not get <u>winded</u> during physical exertion.

3. UPPER BODY DYNAMIC STRENGTH

Requires use of maximum muscle force above the waist necessary to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force above the waist to hold up or move the body weight or objects for a short time.

Using the 7-point scale please rate how much Upper Body Dynamic Strength it takes to perform each of the following tasks on the next page.

4. LOWER BODY DYNAMIC STRENGTH

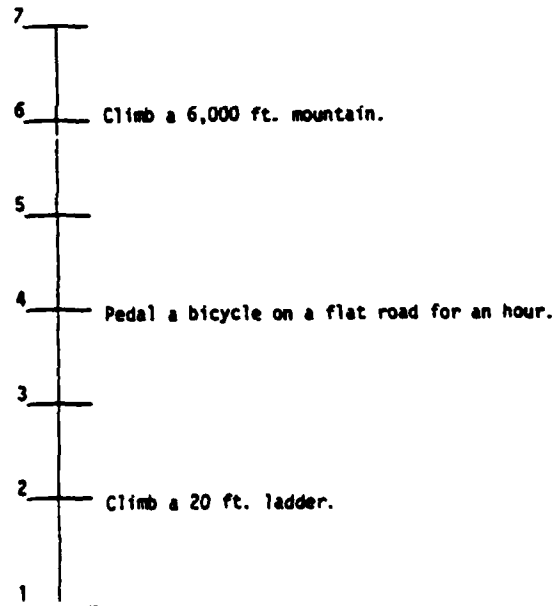
This ability involves the degree to which the muscles in the lower part of the body (i.e., below the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the feet or legs.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's <u>body weight</u> or objects repeatedly.	vs.	Static Strength (1): Exert force against objects.
Use one's muscles to <u>continue to hold up or move</u> one's body weight or an object.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel the body or an object.
Hold up or move one's <u>entire</u> body weight with feet and legs.	vs.	Trunk Strength (4): Hold up or move <u>part, not all</u> , of your body, using <u>mainly stomach and lower back muscles</u> .
Involves the degree to which the specific <u>muscles do not give out</u> .	vs.	Stamina (5): Involves the degree to which one <u>does not get winded during physical exertion</u> .

4. LOWER BODY DYNAMIC STRENGTH

Requires use of all maximum muscle force below the waist to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force below the waist to hold up or move the body weight or objects for a short time

Using the 7-point scale please rate how much Lower Body Dynamic Strength it takes to perform each of the following tasks on the next page.

5. UPPER BODY EXPLOSIVE STRENGTH

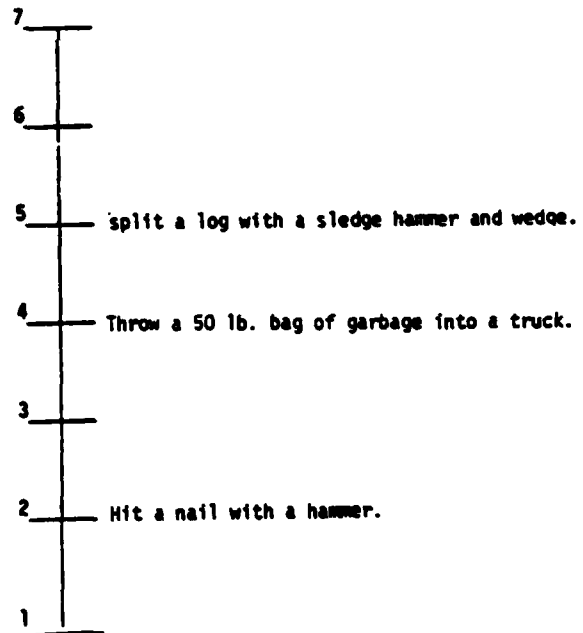
This is the ability to use short bursts of muscle force in the upper part of the body (i.e., above the waist) to propel one's self, as in throwing objects. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use short bursts of muscle force to <u>move</u> the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles.
Does not involve use of muscle force over a long time	vs.	Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
	vs.	Stamina (5): <u>Does</u> involve physical exertion over a long period of time.

5. UPPER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force above the waist to propel one's own body weight or objects.



Requires bursts of a little muscle force above the waist to move one's own body weight or objects.

Using the 7-point scale please rate how much Upper Body Explosive Strength it takes to perform each of the following tasks on the next page.

6. LOWER BODY EXPLOSIVE STRENGTH

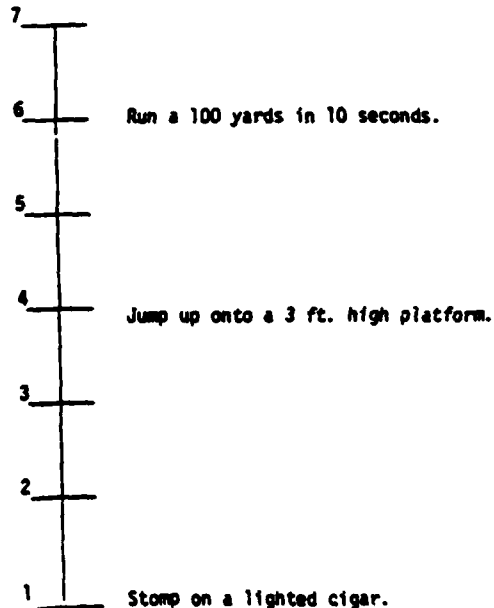
This is the ability to use short bursts of muscle force in the lower part of the body (i.e., below the waist) to propel one's self, as in jumping or sprinting. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the feet and legs.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use <u>short bursts</u> of muscle force to move the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles.
Does not involve use of muscle force over a long time	vs.	Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
	vs.	Stamina (S): <u>Does</u> involve physical exertion over a long period of time.

6. LOWER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force below the waist necessary to propel one's own body weight or objects.



Requires bursts of a little muscle force below the waist to move one's own body weight or objects.

Using the 7-point scale please rate how much Lower Body Explosive Strength it takes to perform each of the following tasks on the next page.

7. TRUNK STRENGTH

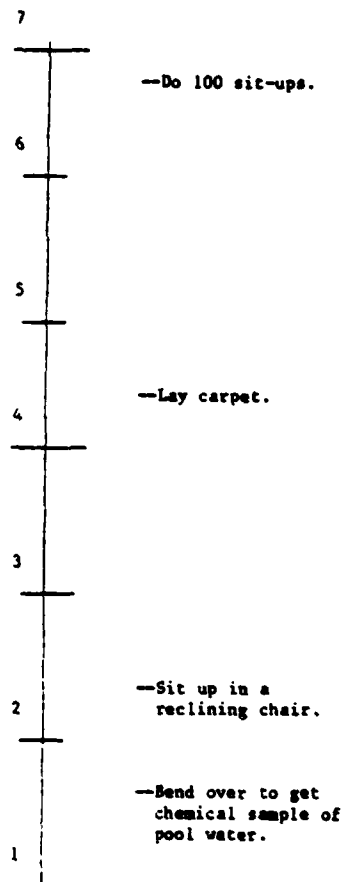
This ability involves the degree to which one's stomach and lower back muscles can support part of the body repeatedly or continuously over time. The ability involves the degree to which these trunk muscles do not "give out," or fatigue, when they are put under such repeated or continuous strain.

HOW TRUNK STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move <u>part</u> , not all, of one's body, using stomach and lower back muscles.	vs.	Dynamic Strength (3): Hold up or move one's <u>entire</u> body weight with the arms and shoulder muscles.
Hold up or move part of one's <u>body weight</u> .	vs.	Static Strength (1): Move <u>objects</u> .
Use your stomach and back muscles to <u>continue to hold up or move</u> part of one's body.	vs.	Explosive Strength (2): Use short bursts of muscle force to propel one's body or an object.
Involves the degree to which the specific <u>stomach and back muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one does not get winded during physical exertion.

7. TRUNK STRENGTH

Requires use of all the stomach and lower back muscle force possible to hold up or move part of your body for as long as possible.



Requires use of a little stomach and lower back muscle force to hold up or move part of your body for a short time.

Using the 7-point scale please rate how much Trunk Strength it takes to perform each of the following tasks on the next page.

8. STAMINA

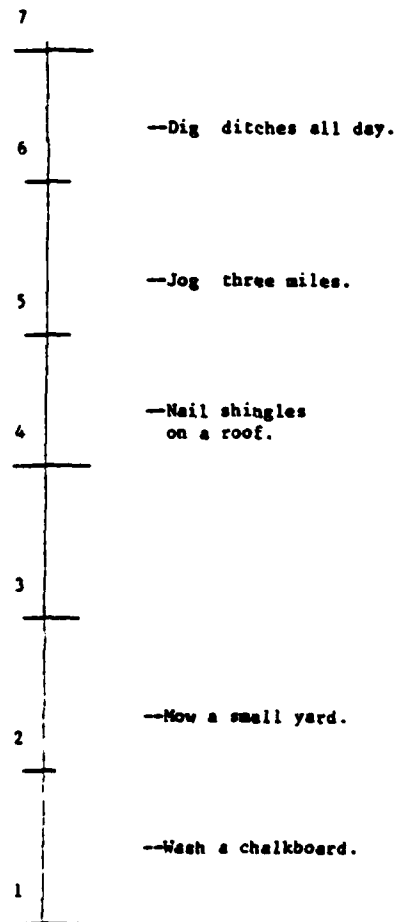
This is the ability to exert oneself physically over a period of time without getting winded or out of breath.

HOW STAMINA IS DIFFERENT FROM OTHER ABILITIES:

Does involve physical exertion over a long time.	vs.	Static Strength (1) and Explosive Strength (2): Do <u>not</u> involve using muscle force over a long time.
Involves not getting <u>winded</u> .	vs.	Dynamic Strength (3) and Trunk Strength (4): Involves one's <u>muscles</u> not getting tired.

8. STAMINA

Requires physical activity of the whole body over a long time, with great strain on the heart and blood vessels.



Requires physical activity of the whole body over a short time with little strain on the heart and blood vessels.

Using the 7-point scale please rate how much Stamina it takes to perform each of the following tasks on the next page.

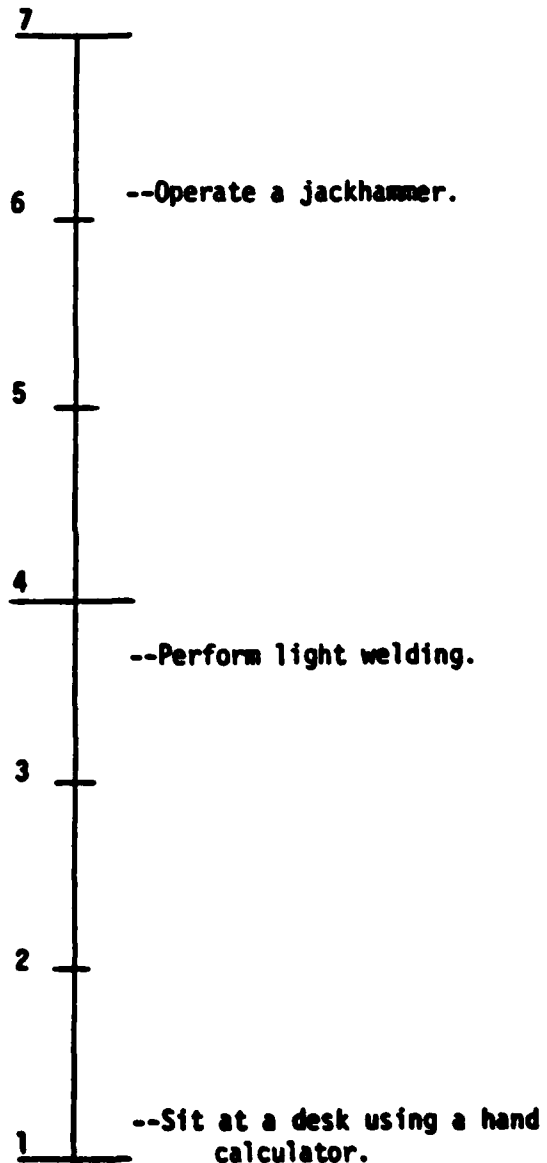
9. EFFORT

This is the degree of physical exertion experienced in performing either a single task or a series of tasks.

9. EFFORT

Requires extensive
physical exertion.

Requires little
physical exertion.

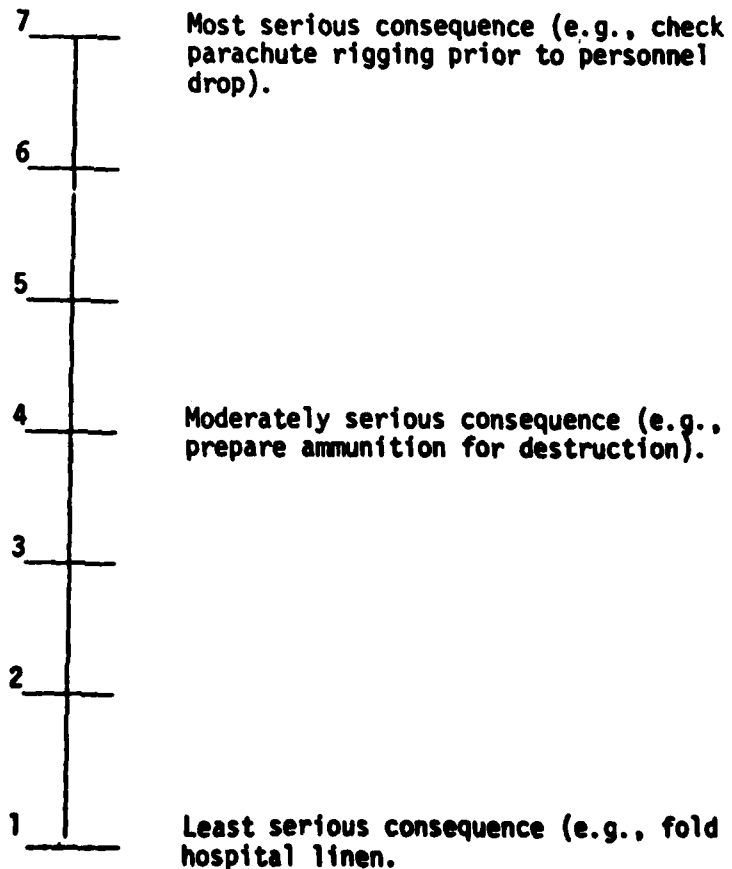


Using the 7-point scale please rate how much Effort it takes to perform each of the following tasks on the next page.

10. CONSEQUENCES OF INADEQUATE PERFORMANCE

This scale is a measure of the seriousness of probable consequences of inadequate performance of a job. It is defined in terms of possible injury or death, wasted supplies, damaged equipment, and wasted man-hours of work. The work is to be rated on a scale from 1 (Least Serious Consequences of Inadequate Performance) to 7 (Most Serious Consequences of Inadequate Performance) with intermediate levels defined as follows:

What will happen if the job is inadequately performed?

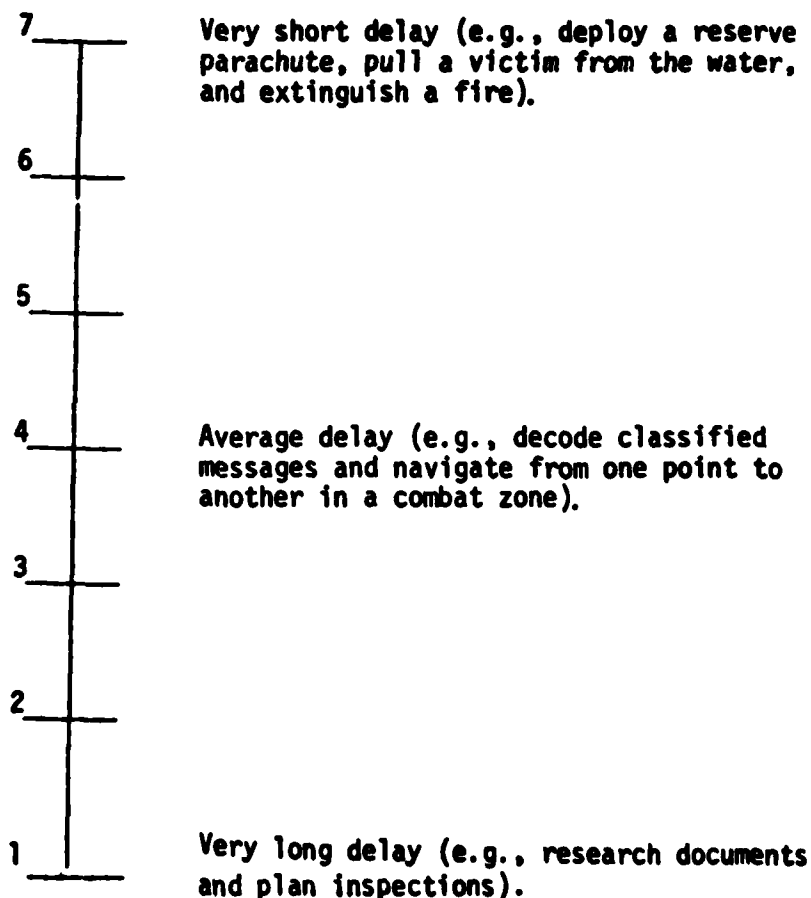


Using the 7-point scale please rate what will happen if the task is inadequately performed.

11. DELAY TOLERANCE

This scale is a measure of how much delay work performance can be tolerated between the time the soldier becomes aware that the work must be performed and the time he must begin doing it. Must the soldier begin immediately, or does he have time to consult a manual, seek guidance, or even be taught to do it? The work is to be rated on a scale from 1 (Very Long Delay Tolerance) to 7 (Very Short Delay Tolerance) with intermediate levels defined as follows:

How much delay before performing
the job is acceptable?

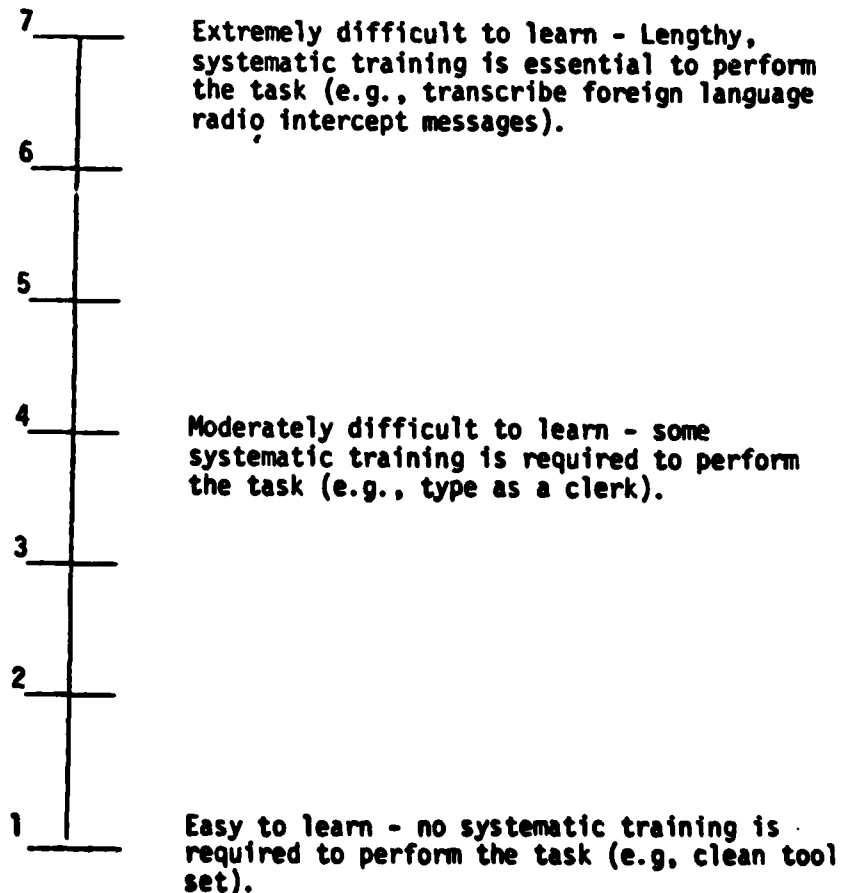


Using the 7-point scale please rate how much delay before performing the task is acceptable.

12. LEARNING DIFFICULTY

This scale is a measure of the need for lengthy, systematic training before a new member of the appropriate Army specialty could perform the job adequately. It may be thought of as the difficulty involved in "picking up" the job. The work is to be rated on a scale from 1 (Easy to Learn) to 7 (Extremely Difficult to Learn) with intermediate levels defined as follows:

How difficult is the job to learn?



Using the 7-point scale please rate how difficult it is to learn the task.

G-1

Descriptive Statistics for Infantryman (118)

	USBS	LBSB	S08H	S08L	USBSH	LBBSH	T5	S	W	CIS	KD	G	E
1. Position casualties on litters during medical evacuation.	4.4 (.9)	3.6 (1.1)	4.2 (1.2)	3.9 (1.6)	4.2 (1.5)	3.8 (1.6)	4.4 (1.2)	4.0 (1.7)	4.8 (1.5)	5.6 (1.2)	5.3 (1.7)	3.5 (1.6)	4.7 (2.0)
2. Carry a casualty on a litter using a one-man pull for 2 hours over hilly terrain.	6.4 (1.1)	5.8 (1.4)	5.3 (1.6)	5.3 (1.7)	5.2 (1.6)	5.2 (1.5)	5.0 (1.5)	5.8 (1.1)	5.7 (1.2)	5.7 (1.4)	5.9 (1.6)	3.6 (1.8)	3.3 (2.2)
3. Carry a casualty on a litter using the two-man technique for 2 hrs. over hilly terrain.	5.7 (1.1)	5.1 (1.5)	5.1 (1.7)	4.9 (1.6)	4.8 (1.7)	4.9 (1.3)	5.1 (1.2)	5.8 (1.3)	5.6 (1.0)	5.5 (1.7)	5.4 (1.7)	3.7 (1.9)	5.2 (2.0)
4. Arm-carry a casualty for 400 meters over hilly terrain.	5.8 (1.4)	5.4 (1.4)	5.5 (1.4)	5.0 (1.8)	5.0 (1.6)	5.4 (1.4)	5.5 (1.3)	6.0 (1.3)	5.6 (1.5)	5.6 (1.5)	5.3 (1.8)	3.7 (1.8)	4.3 (2.3)
5. Load a casualty onto a vehicle.	4.6 (1.2)	4.1 (1.2)	4.6 (1.4)	3.9 (1.1)	4.4 (1.5)	4.6 (1.3)	4.2 (1.1)	4.3 (1.5)	5.6 (1.3)	5.0 (1.5)	5.0 (1.6)	3.3 (1.6)	4.6 (1.9)
6. Unload a casualty from a vehicle.	4.8 (1.4)	4.2 (1.5)	4.5 (1.4)	4.0 (1.4)	4.6 (1.4)	4.6 (1.3)	4.3 (1.1)	4.2 (1.5)	4.6 (1.3)	5.2 (1.3)	5.0 (1.5)	3.3 (1.7)	4.6 (2.0)
7. Move as member of fire team in full gear (i.e., 50 lb. rucksack, pistol belt, canteen, ammo pouches, individual weapon and steel helmet), for 6 hrs. over hilly terrain.	5.8 (1.5)	5.7 (1.5)	5.2 (1.7)	5.2 (1.6)	5.0 (1.8)	5.0 (1.8)	4.8 (1.3)	5.7 (1.4)	5.4 (1.5)	5.4 (1.4)	5.2 (1.7)	4.2 (2.0)	5.3 (1.8)
8. Move under direct fire in full gear.	5.4 (1.5)	5.5 (1.4)	4.8 (1.6)	5.0 (1.3)	4.9 (1.7)	5.2 (1.7)	4.5 (1.4)	5.7 (1.1)	5.0 (1.6)	5.8 (1.4)	5.8 (1.7)	4.0 (1.7)	5.2 (2.2)
9. Move through a stream waist deep.	4.0 (1.0)	4.6 (1.2)	4.2 (1.1)	4.5 (1.4)	4.6 (1.4)	4.6 (1.4)	4.2 (1.4)	4.7 (1.6)	4.4 (1.4)	4.5 (1.2)	4.1 (1.9)	3.0 (1.8)	4.8 (2.4)
10. Move over an 8 ft. concrete obstacle.	5.2 (1.6)	4.7 (1.4)	5.0 (1.5)	4.3 (1.1)	4.6 (1.5)	4.8 (1.1)	4.4 (1.3)	4.8 (1.6)	4.6 (1.6)	4.7 (1.8)	4.5 (2.0)	3.3 (1.8)	4.6 (2.3)
11. Maneuver through and around barbed wire obstacle.	3.9 (4.3)	4.5 (1.4)	4.3 (1.1)	4.2 (1.5)	4.1 (1.4)	4.2 (1.3)	3.9 (1.5)	4.6 (1.6)	4.5 (1.4)	4.9 (1.6)	4.7 (1.8)	3.4 (1.6)	4.5 (2.1)
12. Perform rush for 75 meters within 25 seconds.	4.3 (1.8)	5.1 (1.6)	4.4 (1.7)	4.7 (1.5)	4.6 (1.4)	5.3 (1.6)	4.2 (1.7)	5.2 (1.4)	5.1 (1.5)	5.2 (1.8)	5.5 (1.7)	4.0 (2.0)	4.0 (2.2)
13. Perform high crawl for 35 meters.	4.5 (1.3)	4.6 (1.5)	4.6 (1.4)	4.3 (1.5)	4.6 (1.3)	4.7 (1.4)	4.2 (1.7)	4.9 (1.2)	4.9 (1.5)	4.7 (1.8)	5.3 (1.7)	3.6 (1.7)	3.7 (2.2)
14. Perform low crawl for 35 meters.	4.8 (1.4)	4.6 (1.5)	4.7 (1.2)	4.7 (1.6)	4.8 (1.5)	4.7 (1.6)	4.1 (1.5)	4.9 (1.4)	4.8 (1.7)	5.1 (1.7)	5.2 (1.5)	3.6 (1.7)	3.8 (2.1)
15. Camouflage vehicles using nets and poles (e.g., tanks and 2 1/2 ton truck).	4.0 (1.4)	3.8 (1.5)	4.1 (1.2)	3.9 (1.6)	3.6 (1.5)	3.4 (1.6)	3.5 (1.4)	3.7 (1.6)	3.7 (1.7)	4.7 (2.1)	3.8 (1.4)	4.0 (1.8)	5.1 (1.9)
16. Dig a one-man foxhole.	5.3 (1.4)	4.4 (1.6)	5.3 (1.2)	4.5 (1.7)	4.6 (1.5)	4.1 (1.8)	4.9 (1.4)	5.8 (1.8)	4.8 (1.7)	5.4 (1.5)	4.6 (2.1)	3.8 (1.8)	3.6 (2.5)
17. Dig a two-man foxhole.	5.6 (1.2)	4.4 (1.6)	5.5 (1.1)	4.6 (1.7)	4.6 (1.6)	4.3 (1.8)	4.9 (1.0)	5.1 (1.8)	5.1 (1.7)	5.4 (1.6)	4.6 (2.0)	3.7 (1.8)	5.1 (2.0)

	UBSS	SBS	UBOS	LBS	UBS	SBS	LSB	S	W	d ₁	L ₀	g ₁	M ₀
18. Climb a 20 ft. tree to erect field expedient antenna.	5.0 (1.4)	4.8 (1.4)	4.8 (1.2)	4.2 (1.3)	4.4 (1.6)	4.5 (1.4)	4.2 (1.6)	4.5 (1.5)	4.8 (1.5)	4.7 (1.7)	3.9 (1.5)	3.3 (1.6)	3.4 (2.3)
19. Engage targets with M16A1 rifle.	2.9 (1.5)	2.4 (1.8)	2.9 (1.8)	2.8 (2.1)	2.9 (1.9)	2.6 (1.9)	3.0 (1.7)	3.2 (2.0)	3.0 (1.7)	5.3 (1.6)	5.3 (1.8)	3.8 (1.7)	3.9 (2.5)
20. Mount/dismount .50 caliber machine gun.	4.9 (1.6)	4.0 (1.6)	4.4 (1.6)	4.0 (1.6)	4.2 (1.4)	4.2 (1.7)	4.0 (1.7)	4.3 (1.9)	4.7 (1.6)	5.2 (1.4)	4.8 (1.6)	3.7 (1.8)	4.7 (2.0)
21. Engage targets with .50 caliber machine gun.	3.0 (1.4)	2.5 (1.3)	3.0 (1.8)	2.8 (1.8)	2.9 (1.6)	2.7 (1.7)	3.0 (1.7)	3.4 (2.0)	3.5 (1.7)	5.5 (1.4)	5.6 (1.5)	3.8 (2.1)	3.8 (2.2)
22. Position and emplace M60 machine gun.	3.8 (1.6)	3.3 (1.4)	3.8 (1.6)	3.7 (1.8)	3.7 (1.7)	3.2 (1.2)	3.7 (1.6)	3.8 (1.7)	4.5 (1.2)	5.1 (1.6)	4.8 (1.5)	3.9 (2.0)	4.7 (1.9)
23. Construct M60 machine gun positions.	5.4 (1.4)	3.9 (1.8)	4.7 (1.6)	4.2 (1.7)	4.7 (1.6)	4.0 (1.6)	4.3 (2.0)	4.7 (2.0)	4.9 (1.8)	5.6 (1.2)	5.1 (1.7)	4.3 (1.8)	5.3 (1.2)
24. Load/unload small arms ammunition onto vehicles.	4.5 (1.7)	4.1 (1.6)	4.5 (1.7)	4.2 (1.7)	4.4 (1.8)	3.9 (1.7)	4.4 (1.6)	4.7 (1.4)	4.8 (1.4)	5.7 (1.5)	4.7 (1.7)	3.2 (2.1)	5.4 (1.5)
25. Load/unload anti-armor ammunition onto vehicles.	4.7 (1.5)	4.2 (1.6)	4.7 (1.8)	4.2 (1.6)	4.3 (1.7)	4.0 (1.8)	4.6 (1.6)	4.7 (1.4)	5.1 (1.3)	4.6 (1.6)	4.8 (1.9)	3.0 (2.0)	5.5 (1.2)
26. Load/unload mortar ammunition onto vehicles.	5.3 (1.6)	4.2 (1.8)	5.0 (2.0)	4.4 (1.9)	4.5 (1.8)	4.1 (1.9)	5.0 (1.4)	5.0 (1.5)	5.2 (1.5)	4.6 (1.7)	4.9 (1.8)	3.3 (2.1)	5.6 (1.4)
27. Engage enemy target with hand grenade at a distance.	4.4 (1.8)	3.3 (1.9)	4.4 (1.6)	3.5 (1.8)	3.9 (2.0)	3.1 (1.7)	3.9 (1.9)	3.8 (2.1)	4.0 (1.9)	5.6 (1.8)	5.9 (1.4)	3.5 (2.1)	3.5 (2.4)
28. Remove track from vehicle.	5.3 (1.2)	4.5 (1.8)	5.2 (1.3)	4.2 (1.7)	4.6 (1.4)	4.0 (1.7)	4.9 (1.2)	4.8 (1.4)	5.5 (1.1)	4.5 (1.8)	4.5 (1.2)	3.6 (1.4)	5.4 (1.6)
29. Carry new track to vehicle (30 lb. blocks of 5 shoes).	6.2 (1.1)	5.5 (1.4)	5.9 (1.1)	5.4 (1.6)	5.3 (1.5)	5.0 (1.8)	5.5 (1.2)	5.4 (1.4)	5.9 (.9)	4.6 (1.7)	4.4 (1.9)	3.2 (1.9)	5.6 (1.6)
30. Tighten track with "track jack" and set pins.	5.0 (1.0)	3.6 (1.6)	4.6 (1.2)	3.8 (1.6)	4.2 (1.5)	3.5 (1.7)	4.4 (1.4)	4.3 (1.2)	4.4 (1.3)	4.8 (1.5)	3.9 (1.9)	3.5 (1.5)	4.9 (1.2)
31. Tighten nuts on track with wrench.	4.3 (1.3)	3.5 (1.4)	4.2 (1.4)	3.5 (1.8)	3.9 (1.6)	3.4 (1.5)	4.0 (1.4)	3.9 (1.2)	4.2 (1.3)	4.7 (1.5)	4.1 (1.9)	3.3 (1.3)	3.9 (2.3)
32. Change tire on jeep.	3.8 (1.0)	3.0 (1.4)	3.8 (1.3)	3.0 (1.3)	3.5 (1.6)	3.1 (1.3)	4.0 (1.6)	3.8 (1.7)	4.0 (1.8)	4.6 (1.7)	4.2 (1.9)	3.2 (1.6)	3.7 (2.1)
33. Change tire on 1/4 ton truck.	4.0 (1.0)	3.0 (1.3)	3.8 (1.2)	3.2 (1.4)	3.6 (1.7)	3.2 (1.4)	4.0 (1.6)	3.9 (1.8)	4.0 (1.8)	4.5 (2.0)	4.2 (1.5)	3.2 (1.5)	3.7 (2.6)
34. Change tire on a 3/4 ton truck.	4.4 (1.0)	3.5 (1.3)	4.2 (1.2)	3.6 (1.5)	3.8 (1.5)	3.5 (1.5)	4.3 (1.5)	4.1 (1.6)	4.1 (1.6)	4.6 (1.8)	4.3 (1.7)	3.2 (1.5)	3.6 (2.1)
35. Change tire on a 2 1/2 ton truck.	5.0 (1.0)	3.7 (1.2)	4.5 (1.3)	4.0 (1.7)	4.0 (1.6)	3.8 (1.6)	4.4 (1.7)	4.3 (1.7)	4.3 (1.7)	4.8 (1.9)	4.3 (1.9)	3.2 (1.7)	3.9 (2.1)
36. Change tire on a 5 ton truck.	5.4 (1.0)	4.2 (1.4)	5.0 (1.5)	4.3 (1.8)	4.1 (1.9)	4.1 (1.8)	4.3 (1.5)	4.7 (1.7)	4.6 (1.7)	4.7 (1.9)	4.4 (1.9)	3.3 (1.2)	4.2 (2.2)

	UNSS	LBSS	SOBS	LBDS	UNBS	LBBS	TS	S	W	4C	10	9	Z
37. Load/unload cases of rations from vehicle.	4.3 (1.0)	3.7 (1.4)	4.2 (1.4)	3.8 (1.5)	4.3 (1.7)	3.8 (1.2)	4.6 (1.1)	4.7 (1.4)	4.7 (1.3)	4.7 (1.5)	4.3 (1.8)	2.6 (1.7)	5.0 (1.5)
38. Load/unload communications equipment from vehicle.	4.1 (1.2)	3.5 (1.5)	4.0 (1.4)	3.7 (1.4)	4.2 (1.5)	3.5 (1.2)	4.3 (1.2)	4.4 (1.6)	4.5 (1.2)	4.6 (1.7)	4.3 (1.8)	2.7 (1.6)	5.2 (1.4)
39. Load/unload NBC equipment from vehicles.	4.0 (1.1)	3.5 (1.2)	3.9 (1.3)	3.7 (1.4)	4.0 (1.6)	3.4 (1.3)	4.2 (1.2)	4.4 (1.4)	4.5 (1.3)	4.8 (1.8)	4.4 (1.9)	2.8 (1.7)	5.2 (1.5)
40. Load/unload weapons from vehicle.	4.5 (1.5)	4.1 (1.5)	4.4 (1.4)	3.8 (1.5)	4.2 (1.7)	3.8 (1.3)	4.5 (1.2)	4.5 (1.4)	4.6 (1.2)	5.0 (1.7)	4.7 (1.8)	2.9 (1.8)	5.4 (1.1)
41. Carry water in two 5-gallon cans for 100 meters to obtain drinking water.	5.1 (1.3)	5.3 (1.2)	5.5 (1.2)	5.0 (1.5)	5.0 (1.2)	4.5 (1.6)	4.8 (1.6)	5.1 (1.5)	5.1 (1.7)	4.5 (1.9)	4.0 (1.8)	2.8 (1.7)	3.7 (2.1)
42. Construct field latrines (2'x4').	4.8 (1.4)	3.8 (1.4)	4.6 (1.8)	3.9 (1.5)	4.4 (1.6)	3.7 (1.5)	4.1 (1.3)	4.2 (1.5)	4.1 (1.7)	3.7 (1.8)	3.8 (1.7)	3.5 (1.7)	4.6 (2.0)
43. Participate in daylight jump.	4.3 (1.6)	4.6 (1.6)	4.0 (1.7)	3.8 (1.5)	3.8 (1.7)	3.9 (1.6)	3.8 (1.6)	3.9 (1.7)	4.5 (1.5)	5.0 (1.8)	4.3 (1.8)	4.4 (2.0)	4.0 (2.2)
44. Recover own parachute.	4.0 (1.5)	3.8 (1.8)	3.7 (1.4)	3.5 (1.7)	3.6 (1.7)	3.3 (1.5)	3.7 (1.4)	3.7 (1.8)	4.1 (1.7)	4.3 (1.8)	4.6 (1.9)	4.0 (1.9)	2.9 (2.1)
45. Rappel from a 30 ft. tower.	4.4 (1.7)	4.3 (1.4)	4.5 (1.7)	4.0 (1.5)	4.4 (1.6)	4.4 (1.5)	4.2 (1.5)	4.0 (1.7)	4.3 (1.8)	5.4 (1.6)	4.7 (2.0)	4.2 (1.8)	4.2 (2.3)
46. Administer mouth to mouth resuscitation for 45 minutes.	4.1 (2.0)	2.5 (1.6)	3.3 (1.8)	2.7 (1.8)	3.6 (2.0)	2.9 (1.8)	3.1 (1.7)	4.0 (2.1)	3.8 (2.0)	5.3 (1.7)	5.8 (1.3)	4.2 (1.6)	3.9 (1.9)
47. Perform external heart massage.	3.7 (1.5)	2.4 (1.6)	3.0 (1.7)	2.7 (1.8)	3.0 (1.8)	2.5 (1.6)	2.9 (1.6)	3.8 (2.2)	3.5 (1.9)	5.3 (1.7)	5.8 (1.4)	4.2 (1.7)	3.8 (1.9)
Average across tasks.	4.7 (.6)	4.1 (.7)	4.5 (.7)	4.1 (.9)	4.2 (.9)	4.0 (.8)	4.3 (.7)	4.5 (1.0)					
Overall jobs.	5.4 (.7)	5.3 (1.1)	5.4 (1.2)	5.3 (1.3)	4.8 (.8)	5.2 (1.1)	5.6 (1.0)	5.9 (.8)	4.8 (1.5)	5.7 (1.5)	5.4 (1.2)	5.2 (1.3)	5.8 (1.3)

Descriptive Statistics for Combat Engineer (128)

	UBSS	CBSB	UBSB	LBSB	TB	S	M	DIP	TD	G	PW
1. Carry sand bags to build a bunker.	5.1 (1.2)	4.5 (1.9)	4.9 (1.4)	4.8 (1.7)	4.4 (1.6)	4.0 (2.0)	5.1 (1.7)	5.2 (1.5)	4.1 (1.8)	4.0 (1.6)	2.5 (2.1)
2. Dig a one-man foxhole using an entrenching tool.	5.5 (1.1)	3.4 (1.6)	5.3 (1.4)	4.1 (1.9)	4.6 (2.1)	3.5 (1.7)	5.0 (1.4)	5.4 (1.4)	4.6 (1.7)	4.1 (1.7)	3.6 (2.2)
3. Construct a machine gun emplacement.											
4. Dig a skirmishers trench using the long handled shovel.	4.3 (1.6)	3.6 (1.7)	4.4 (1.8)	3.6 (1.7)	4.3 (1.6)	3.5 (1.8)	4.3 (1.5)	5.1 (1.3)	4.6 (1.7)	4.6 (1.5)	4.4 (2.0)
5. Excavate earth from around a small foundation using D-handle shovel.	5.0 (1.3)	3.7 (1.8)	5.1 (1.5)	4.4 (1.6)	4.5 (1.8)	3.9 (1.8)	4.5 (1.5)	5.0 (1.4)	4.0 (1.6)	4.1 (1.9)	4.4 (2.0)
6. Break up road surface using pneumatic paving breaker.	4.5 (1.4)	3.7 (1.3)	4.7 (1.6)	3.9 (1.4)	4.1 (1.8)	4.0 (1.7)	4.4 (1.3)	4.9 (1.4)	3.9 (1.6)	3.7 (1.4)	4.7 (1.8)
7. Cut down trees 8 inches in diameter using a chain saw to make logs for an expedient road surface.	5.3 (1.3)	3.8 (1.5)	5.2 (1.4)	3.7 (1.6)	4.5 (1.8)	4.0 (1.7)	5.0 (1.5)	5.1 (1.3)	4.0 (1.4)	4.0 (1.5)	4.8 (1.9)
8. Dig a two-man foxhole using an entrenching tool.	4.9 (1.4)	3.5 (1.6)	4.9 (1.6)	3.7 (1.5)	4.3 (1.7)	3.9 (1.8)	4.6 (1.5)	5.3 (1.3)	4.6 (1.6)	4.5 (1.5)	4.5 (1.9)
9. Cut down a tree 10 inches in diameter using a 2-man cross cut saw to make log box culverts.	6.0 (1.2)	3.4 (1.7)	5.5 (1.3)	4.0 (1.6)	4.4 (1.8)	3.9 (1.8)	4.9 (1.5)	5.1 (1.6)	4.5 (1.6)	4.5 (1.4)	4.9 (2.0)
10. Loosen the hard clay soil with a pick to construct a shelter.	5.5 (1.1)	3.1 (1.7)	5.5 (1.4)	3.9 (1.6)	4.7 (1.9)	3.8 (1.7)	5.0 (1.3)	5.1 (1.6)	4.5 (1.5)	4.2 (1.7)	5.4 (1.9)
11. Dig postholes using posthole digger for anchoring a bridge.	5.7 (1.8)	3.7 (1.6)	5.1 (1.7)	3.5 (1.3)	5.0 (1.6)	4.1 (1.7)	5.2 (1.3)	5.5 (1.4)	4.2 (1.8)	4.1 (1.6)	4.6 (1.9)
12. Dig postholes using posthole auger for anchoring a bridge.	5.1 (1.9)	3.4 (1.4)	5.0 (1.6)	3.6 (1.4)	4.9 (1.9)	3.7 (1.6)	4.8 (1.5)	5.4 (1.5)	4.2 (1.7)	4.0 (1.7)	4.8 (1.9)
13. Pack down loose earth around a foundation using backfill tamping.	4.5 (1.6)	3.2 (1.5)	4.5 (1.4)	3.7 (1.5)	4.3 (1.6)	3.7 (1.5)	4.4 (1.5)	4.7 (1.5)	4.6 (1.6)	4.0 (1.5)	4.9 (1.8)
14. Cut down trees using a single-bit ax to clear a bridge site.	5.9 (1.2)	3.7 (1.5)	5.4 (1.5)	4.1 (1.6)	5.0 (1.5)	4.1 (1.8)	5.0 (1.5)	5.7 (1.4)	4.4 (1.3)	4.0 (1.6)	4.8 (1.9)
15. Smooth logs with an adz for making posts.	4.5 (1.5)	3.3 (1.6)	4.6 (1.9)	3.5 (1.7)	4.0 (1.3)	3.8 (1.4)	4.4 (1.3)	5.0 (1.2)	4.4 (1.6)	3.7 (1.5)	4.3 (2.2)
16. Load/unload pioneer tool kit from vehicle.	5.1 (1.7)	4.5 (1.5)	4.7 (1.5)	4.4 (1.6)	4.7 (1.8)	4.7 (1.9)	4.7 (1.5)	4.9 (1.5)	4.0 (1.6)	3.3 (1.5)	3.6 (2.0)
17. Carry lumber to work site (e.g., 4"x8' plywood, 2"x8"x16' and 2"x6"x10') for constructing shelters and bunkers.	5.0 (1.2)	4.3 (1.6)	4.8 (1.5)	4.2 (1.5)	4.1 (1.6)	4.0 (1.6)	4.7 (1.5)	4.8 (1.6)	4.4 (1.6)	4.4 (1.8)	4.9 (2.1)

COMBAT ENGINEER 12B (Cont.)

	SS5	SS8	SS0N	SS0L	SS3N	SS3L	S2	S	W	413	46	Q	Z
18. Cut lumber to specification using one-hand hand saw (e.g., 2"x4"x10').	4.7 (1.5)	3.5 (1.4)	4.8 (1.5)	3.2 (1.6)	4.3 (1.9)	3.5 (1.7)	4.5 (1.2)	4.9 (1.6)	5.0 (1.5)	4.7 (1.9)	4.2 (1.6)	3.0 (2.0)	5.0 (1.9)
19. Break up surface of road using double-faced sledge.	5.9 (1.1)	3.4 (1.4)	5.5 (1.5)	3.4 (1.5)	5.3 (1.5)	4.0 (1.7)	5.0 (1.5)	5.3 (1.8)	5.6 (1.4)	4.1 (1.6)	4.2 (1.5)	2.3 (1.9)	4.7 (2.0)
20. Climb 20 foot poles to install communication wire.	4.5 (1.6)	4.9 (1.6)	4.5 (1.3)	4.6 (1.8)	4.2 (1.8)	4.7 (1.7)	4.6 (1.3)	5.0 (1.4)	4.8 (1.5)	4.9 (1.7)	4.4 (1.8)	3.2 (1.7)	4.0 (2.3)
21. Move logs using the peavy in order to construct expedient obstacles.	4.7 (1.7)	4.4 (1.6)	4.5 (1.4)	4.0 (1.4)	4.6 (1.6)	4.1 (1.7)	5.0 (1.4)	5.0 (1.3)	4.8 (1.6)	4.5 (1.8)	4.2 (1.7)	2.8 (1.7)	5.6 (2.0)
22. Drive U-shaped pickets into ground with metal hammer in order to install barbed wire obstacles.	4.6 (1.1)	3.1 (1.6)	5.0 (1.4)	3.6 (1.4)	5.0 (1.6)	3.7 (1.7)	5.0 (1.4)	5.0 (1.6)	5.2 (1.5)	4.9 (1.5)	4.1 (1.4)	2.8 (2.0)	5.2 (1.8)
23. Carry rolls of concertina wire or barbed wire to work site to be used for constructing obstacles.	4.5 (1.3)	3.9 (1.8)	4.5 (1.5)	4.2 (1.6)	4.4 (1.6)	4.0 (1.9)	4.8 (1.2)	5.0 (1.6)	5.1 (1.4)	4.5 (1.5)	4.1 (1.5)	2.5 (1.6)	5.0 (2.1)
24. Install steel paving form to construct a concrete headwall.	5.0 (1.4)	3.5 (1.5)	4.3 (1.5)	3.8 (1.4)	4.3 (1.6)	3.8 (1.8)	4.5 (1.4)	4.6 (1.4)	4.8 (1.5)	4.4 (1.7)	3.8 (1.6)	3.8 (2.0)	4.5 (2.1)
25. Haul dirt in a wheelbarrow while digging a small foundation.	4.8 (1.3)	4.4 (1.8)	4.8 (1.6)	4.7 (1.7)	5.1 (1.4)	4.3 (1.8)	5.4 (1.2)	5.4 (1.7)	5.4 (1.5)	4.3 (1.6)	4.0 (1.6)	2.2 (1.8)	4.3 (2.3)
26. Load dirt into haul unit using a shovel.	5.1 (1.2)	3.6 (1.6)	5.1 (1.6)	4.0 (1.5)	4.7 (1.7)	4.0 (1.9)	5.2 (1.3)	5.0 (1.6)	5.3 (1.5)	4.1 (1.6)	3.9 (1.5)	2.4 (1.9)	4.4 (2.2)
27. Carry bags of cement from vehicle to work site.	5.6 (1.2)	4.6 (1.6)	5.4 (1.4)	4.8 (1.5)	5.0 (1.6)	4.5 (1.9)	5.5 (1.3)	5.5 (1.5)	5.7 (1.1)	4.0 (1.7)	4.2 (1.5)	2.0 (2.0)	4.6 (2.2)
28. Load sand and gravel into hopper of 165 mixer.	4.5 (1.4)	3.5 (1.7)	4.9 (1.6)	3.7 (1.5)	4.6 (1.9)	4.0 (1.7)	5.0 (1.3)	5.0 (1.5)	5.0 (1.6)	4.0 (1.8)	4.2 (1.6)	2.3 (1.7)	4.5 (2.1)
29. Level fresh cement with board (screen).	4.0 (1.3)	2.9 (1.3)	4.0 (1.5)	3.1 (1.6)	3.8 (1.7)	3.6 (1.9)	4.3 (1.2)	3.9 (1.8)	4.1 (1.4)	4.0 (1.8)	4.1 (1.6)	3.0 (1.6)	4.7 (2.1)
30. Climb a ladder holding a bundle of shingles for repairing a damaged roof.	4.9 (1.6)	4.5 (1.7)	4.6 (1.9)	4.6 (1.6)	4.4 (2.0)	4.2 (1.7)	4.7 (1.2)	4.7 (1.9)	4.8 (2.0)	4.5 (1.8)	4.4 (1.5)	2.6 (1.6)	4.4 (2.3)
31. Install shingles using hammer and nails to repair a damaged roof.	3.7 (1.2)	2.2 (1.2)	4.0 (1.4)	2.9 (1.5)	4.2 (1.5)	3.1 (1.9)	3.8 (1.4)	3.9 (1.7)	4.0 (1.5)	3.9 (1.6)	4.3 (1.6)	3.1 (1.6)	4.1 (2.2)
32. Carry two one-gallon buckets of paint up on a scaffold to paint ceiling.	3.9 (1.7)	3.5 (1.4)	3.9 (1.6)	3.8 (1.8)	3.7 (1.6)	3.8 (1.7)	4.1 (1.3)	4.0 (1.5)	4.1 (1.6)	4.2 (1.7)	4.0 (1.6)	2.5 (1.6)	3.7 (2.4)
33. Paint a ceiling using brushes and rollers.	4.0 (2.0)	2.5 (1.1)	4.1 (1.8)	3.0 (1.5)	3.9 (1.8)	3.3 (1.7)	4.0 (1.5)	3.8 (1.6)	4.1 (1.8)	4.0 (1.6)	3.9 (1.6)	3.4 (1.7)	4.1 (2.2)

COMBAT ENGINEER 12B (Cont.)

	SSBN	SSS	S080	S087	S380	S387	S1	S	W	LS	G	P
34. Install metal pipe culverts to provide drainage around an air field.	4.6 (1.4)	3.9 (1.6)	4.8 (1.5)	3.7 (1.7)	4.2 (1.6)	3.8 (1.9)	4.0 (1.8)	4.6 (1.6)	4.7 (1.6)	4.9 (1.5)	3.9 (1.9)	4.7 (2.1)
35. Clean drainage ditches located along a road using a shovel.	4.4 (1.8)	3.6 (1.6)	4.7 (1.6)	3.9 (1.7)	4.2 (1.8)	3.7 (1.9)	4.2 (1.8)	4.7 (1.7)	5.0 (1.3)	4.3 (1.6)	4.2 (1.4)	4.8 (2.1)
36. Clean culverts along a road using a shovel.	4.3 (1.5)	3.6 (1.6)	4.7 (1.6)	3.9 (1.8)	4.2 (1.8)	3.7 (1.9)	4.4 (1.7)	4.7 (1.6)	5.1 (1.4)	4.1 (1.6)	4.3 (1.6)	4.8 (2.0)
37. Unload wire mesh from vehicle in order to construct expedient road surface.	4.3 (1.2)	3.7 (1.5)	4.3 (1.7)	4.0 (1.5)	4.0 (1.6)	4.1 (2.0)	4.7 (1.6)	4.5 (1.7)	5.2 (1.4)	4.4 (1.3)	4.2 (1.8)	4.9 (2.0)
38. Roll out wire mesh on road surface.	3.8 (1.1)	3.7 (1.7)	4.3 (1.5)	3.7 (1.7)	3.9 (1.6)	3.9 (2.0)	4.1 (1.6)	4.2 (1.7)	4.7 (1.6)	4.3 (1.5)	4.0 (1.5)	5.0 (1.9)
39. Stake mesh down to finish expedient road surface.	3.9 (1.4)	3.3 (1.5)	4.2 (1.4)	3.2 (1.2)	4.3 (1.6)	3.4 (1.8)	4.3 (1.2)	4.3 (1.8)	4.5 (1.8)	4.1 (1.3)	4.0 (1.4)	5.0 (2.0)
40. Remove rock and stumps using a shovel and pickmatic before installing aluminum landing mats.	5.8 (1.0)	4.0 (1.5)	5.5 (1.4)	4.6 (1.7)	5.0 (1.5)	4.4 (1.9)	5.5 (1.2)	5.6 (1.5)	5.6 (1.4)	4.5 (1.5)	4.0 (1.6)	5.2 (1.7)
41. Unload aluminum landing mats from vehicle and emplace mats on the field.	5.1 (1.2)	3.9 (1.6)	5.2 (1.7)	4.3 (1.8)	4.6 (1.5)	4.3 (2.0)	5.1 (1.2)	5.0 (2.1)	5.2 (1.7)	4.5 (1.7)	4.1 (1.6)	5.3 (2.0)
42. Camouflage equipment using poles and nets.	3.6 (1.1)	3.1 (1.4)	4.0 (1.5)	3.3 (1.5)	3.4 (1.6)	3.3 (1.8)	3.9 (1.4)	4.0 (1.6)	4.5 (1.4)	5.0 (1.6)	4.1 (1.7)	5.3 (1.9)
43. Unload mines at mine dump.	4.1 (1.4)	3.6 (1.7)	4.5 (1.8)	3.7 (1.9)	4.1 (1.9)	3.8 (1.9)	4.6 (1.3)	4.6 (1.8)	5.3 (1.5)	5.1 (1.6)	4.3 (1.7)	4.8 (2.0)
44. Make lashings to construct a gin pole.	3.3 (1.5)	2.3 (1.4)	3.5 (1.4)	2.8 (1.7)	3.4 (1.6)	3.4 (1.8)	3.4 (1.7)	3.5 (1.6)	4.2 (1.4)	4.4 (1.8)	3.9 (1.5)	4.7 (2.1)
45. Make shears to lash logs together in order to build an expedient road surface.	3.9 (1.6)	3.1 (1.7)	3.9 (1.5)	3.1 (1.7)	3.7 (1.7)	3.6 (1.8)	3.6 (1.6)	3.8 (1.8)	3.9 (1.4)	4.1 (1.9)	3.8 (1.3)	4.5 (2.2)
46. Construct a Bailey bridge:												
46a. Eight men carry transom from vehicle to bridge site.	5.8 (1.3)	5.6 (1.3)	6.0 (1.2)	5.7 (1.0)	5.5 (1.7)	5.2 (1.7)	6.1 (1.1)	6.0 (1.6)	6.4 (1.0)	5.6 (1.5)	5.1 (1.6)	6.1 (1.5)
46b. Six men carry panels from vehicle to bridge site.	5.8 (1.3)	5.7 (1.1)	5.9 (1.3)	5.6 (1.0)	5.6 (1.6)	5.3 (1.8)	6.0 (1.2)	6.0 (1.5)	6.4 (1.0)	5.6 (1.5)	5.1 (1.6)	6.4 (1.0)
46c. Connect the end of the transom to top of the panels using a raker.	5.0 (1.6)	4.7 (1.7)	5.3 (1.6)	5.0 (1.3)	5.3 (1.4)	4.7 (2.1)	5.7 (1.4)	5.5 (1.3)	6.0 (1.2)	5.5 (1.6)	4.8 (1.6)	6.1 (1.4)
46d. Install bracing.	4.3 (1.5)	3.7 (1.7)	4.7 (1.2)	4.0 (1.4)	4.9 (1.8)	3.9 (2.1)	4.8 (1.3)	4.8 (1.6)	5.1 (1.5)	5.4 (1.1)	4.8 (1.4)	5.9 (2.0)

	US88	US89	US90	US91	US92	US93	US94	US95	US96	US97	US98	US99	2000
46e. Emplace stringers.	5.0 (1.4)	4.4 (1.5)	5.2 (1.4)	4.5 (1.4)	5.1 (1.7)	4.3 (2.2)	5.3 (1.5)	5.1 (1.6)	5.6 (1.2)	4.7 (1.4)	3.8 (2.0)	6.1 (1.3)	
46f. Emplace chess to form the road surface on the bridge.	4.6 (1.5)	4.2 (1.6)	4.9 (1.4)	4.4 (1.6)	4.7 (1.7)	4.0 (2.2)	5.3 (1.2)	5.0 (1.6)	5.5 (1.4)	4.7 (1.5)	3.7 (2.1)	6.0 (1.4)	
46g. Install ribband to serve as the bridge's curb.	4.6 (1.3)	4.4 (1.6)	4.8 (1.3)	4.5 (1.6)	4.9 (1.5)	4.1 (2.2)	5.2 (1.3)	5.2 (1.3)	5.5 (1.3)	4.4 (1.6)	3.6 (1.9)	6.2 (1.2)	
47. Construct M16 float bridge:													
47a. Unload float from vehicle.	5.5 (1.6)	5.0 (1.7)	5.5 (1.6)	5.3 (1.6)	5.1 (1.7)	4.7 (2.1)	5.1 (1.5)	5.5 (1.8)	5.9 (1.4)	4.6 (1.8)	2.8 (1.8)	6.0 (1.5)	
47b. Unroll float and inflate.	4.5 (1.8)	4.5 (1.8)	4.9 (1.7)	5.1 (1.4)	5.1 (1.7)	5.0 (2.0)	5.6 (1.5)	5.5 (1.7)	5.6 (1.3)	4.5 (1.8)	2.8 (1.8)	6.1 (1.2)	
47c. Connect two half floats.	4.5 (1.6)	4.0 (1.9)	4.8 (1.7)	4.2 (1.6)	4.7 (1.6)	4.4 (2.2)	5.0 (1.7)	5.0 (1.9)	5.5 (1.5)	4.4 (1.8)	3.6 (1.9)	6.0 (1.4)	
47d. Four men carry saddle adapter from vehicle to bridge site.	5.2 (1.3)	5.1 (1.4)	5.5 (1.3)	5.3 (1.2)	5.1 (1.7)	4.7 (2.1)	5.7 (1.2)	5.6 (1.5)	5.9 (1.0)	4.7 (1.6)	3.0 (1.9)	6.0 (1.5)	
47e. Install panels.	5.2 (1.3)	4.8 (1.3)	5.0 (1.4)	4.9 (1.5)	5.0 (1.5)	4.5 (2.1)	5.6 (1.1)	5.6 (1.5)	6.0 (1.3)	4.5 (1.6)	3.6 (2.0)	6.1 (1.3)	
47f. Install deck balk.	5.9 (1.0)	5.4 (1.4)	5.5 (1.4)	5.4 (1.5)	5.1 (1.5)	5.0 (2.0)	6.0 (1.0)	5.8 (1.6)	6.1 (1.2)	4.5 (1.7)	3.6 (2.0)	6.2 (1.2)	
47g. Move decking into place using a 60" pinch bar.	5.1 (1.2)	4.6 (1.7)	4.6 (1.6)	4.5 (1.9)	5.0 (1.8)	4.5 (2.1)	5.5 (1.1)	5.0 (1.7)	5.5 (1.4)	4.8 (1.7)	3.6 (2.1)	5.7 (1.6)	
48. Construct light tactical raft/bridge (LTR).													
48a. Ten men carry ponton from vehicle to bridge site.	5.6 (.8)	5.5 (1.3)	5.5 (1.5)	5.6 (1.2)	5.4 (1.6)	5.4 (2.0)	5.9 (1.2)	5.8 (1.4)	5.8 (1.5)	4.6 (1.7)	3.2 (2.0)	6.1 (1.5)	
48b. Two men maneuver pontoons in water in order to hook them together with pins.	4.4 (1.8)	4.6 (1.5)	5.0 (1.7)	4.7 (1.6)	5.1 (1.8)	5.0 (2.1)	5.5 (1.2)	5.2 (1.6)	5.4 (1.7)	4.8 (1.6)	3.0 (1.9)	6.0 (1.4)	
48c. Four men carry decking from vehicle to bridge site.	5.2 (1.3)	4.9 (1.7)	5.6 (1.3)	5.4 (1.4)	5.3 (1.7)	5.3 (2.1)	6.0 (1.3)	5.6 (1.6)	6.0 (1.1)	5.0 (1.7)	3.0 (1.8)	6.0 (1.3)	
48d. Emplace decking onto pontoons.	5.1 (1.4)	4.7 (1.5)	5.4 (1.4)	4.9 (1.5)	5.3 (1.5)	5.0 (1.9)	5.5 (1.0)	5.5 (1.5)	5.7 (1.4)	4.7 (1.7)	3.1 (1.8)	6.0 (1.2)	
48e. Carry ramps from vehicle to bridge.	5.9 (1.1)	5.2 (1.7)	5.6 (1.6)	5.5 (1.4)	5.5 (1.6)	5.1 (1.8)	6.0 (1.0)	5.8 (1.3)	6.0 (1.1)	4.5 (1.8)	3.3 (1.9)	6.2 (1.0)	
48f. Install picket holdfasts to tie onto for anchorage.	4.9 (1.7)	4.0 (1.4)	4.8 (1.2)	3.9 (1.4)	5.0 (1.4)	4.0 (1.8)	5.4 (1.0)	4.7 (1.6)	5.3 (1.3)	4.5 (1.8)	3.5 (2.1)	6.0 (1.5)	

Basic Combat/Tactical Operations

COMBAT ENGINEER 12B (Cont.)

	UBSS	LBSS	UBOS	LBOS	UBCS	LBOS	TS	SS	WS	412	10	9	7
58. Construct individual defensive position.	5.1 (1.3)	4.2 (1.6)	4.6 (1.6)	4.1 (1.6)	4.5 (1.8)	3.9 (2.1)	4.5 (1.6)	4.7 (1.8)	5.2 (1.4)	5.2 (1.7)	4.8 (1.9)	3.6 (1.8)	4.5 (2.2)
59. Camouflage equipment using nets and poles.	4.5 (1.4)	3.6 (1.6)	4.0 (1.6)	3.3 (1.5)	3.9 (1.5)	3.1 (1.8)	3.8 (1.3)	3.8 (1.4)	4.2 (1.6)	4.9 (1.9)	4.1 (2.0)	3.7 (1.8)	5.4 (1.5)
60. Perform operator maintenance on M16A1 rifle, magazine, and ammunition.	2.8 (1.7)	2.1 (.9)	2.4 (1.2)	3.0 (1.7)	3.1 (1.5)	2.4 (1.7)	2.7 (1.6)	3.1 (1.6)	3.3 (1.6)	4.9 (2.0)	4.9 (1.8)	3.5 (2.0)	4.2 (1.2)
61. Engage enemy targets with M16A1 rifle.	2.4 (1.7)	1.7 (.8)	2.4 (1.4)	2.6 (1.4)	3.0 (1.5)	2.7 (2.1)	2.8 (1.7)	3.3 (2.1)	3.6 (1.9)	5.3 (1.8)	5.3 (1.9)	3.3 (1.9)	3.9 (2.3)
62. Engage enemy targets with hand grenades.	3.8 (1.7)	1.7 (.8)	2.3 (1.2)	2.6 (1.5)	3.8 (1.8)	2.8 (1.7)	3.1 (1.5)	3.4 (2.2)	4.0 (1.9)	5.8 (1.5)	5.5 (1.9)	3.0 (2.0)	4.1 (2.4)
63. Load/unload ammunition and supplies from vehicles.	4.7 (1.5)	4.3 (1.6)	4.3 (1.6)	4.0 (2.0)	4.5 (1.8)	4.1 (2.2)	4.5 (1.8)	4.4 (2.0)	5.3 (1.3)	5.7 (1.4)	5.1 (1.7)	2.9 (1.9)	5.2 (2.0)
64. Change tires to maintain the unit's vehicles.	5.1 (1.2)	4.2 (1.9)	4.7 (1.6)	4.1 (1.7)	5.1 (1.7)	4.5 (2.0)	4.8 (1.8)	4.6 (2.1)	5.6 (1.1)	5.3 (1.5)	4.6 (1.5)	3.5 (1.9)	4.8 (2.0)
Average across tasks	4.7 (.7)	3.9 (1.1)	4.7 (1.1)	4.1 (1.1)	4.3 (1.6)	4.0 (1.5)	4.1 (.8)	4.8 (1.2)					
Overall job	5.6 (.7)	5.1 (1.2)	5.6 (1.0)	5.3 (.9)	5.2 (1.2)	5.2 (1.4)	5.4 (.9)	6.0 (.9)	5.7 (1.2)	5.5 (.9)	4.5 (1.6)	4.3 (1.7)	5.5 (1.4)

Descriptive Statistics for Iank Crewman (19£)

	UNSS	SSS1	US00	LB05	US08	S301	S5	W	Q13	B	E
1. Unload machine gun (50 cal. and coax) ammunition from vehicles.	3.8 (1.6)	3.2 (1.3)	3.7 (1.5)	3.1 (1.5)	3.6 (1.5)	2.7 (1.7)	3.7 (1.6)	3.4 (1.6)	4.1 (1.8)	4.7 (1.5)	2.4 (1.7)
2. Unload main gun ammunition from vehicle.	5.4 (1.3)	4.0 (1.5)	5.2 (1.5)	3.8 (1.3)	4.2 (1.7)	3.0 (1.7)	4.5 (1.6)	4.6 (1.7)	5.4 (1.8)	5.0 (1.5)	2.5 (1.6)
3. Remove ammunition from containers.	4.2 (1.9)	3.3 (1.5)	4.8 (1.3)	3.3 (1.4)	4.0 (1.4)	3.0 (1.7)	4.0 (1.9)	4.6 (1.8)	4.8 (2.0)	4.9 (1.7)	2.6 (1.6)
4. Pass ammunition from ground to person on turret.	5.4 (1.2)	4.0 (1.3)	5.4 (1.0)	3.6 (1.4)	4.7 (1.5)	3.1 (1.7)	4.4 (1.7)	4.6 (1.4)	5.2 (1.8)	4.7 (1.4)	2.5 (1.6)
5. Remove round from ammo well and load M60/M60A1 tank main gun for three successive firings.	5.3 (1.4)	3.4 (1.3)	4.6 (1.6)	3.2 (1.6)	4.7 (1.6)	3.3 (1.4)	4.3 (1.6)	3.9 (1.4)	5.4 (1.9)	5.6 (1.6)	2.9 (1.4)
6. Unload misfired main gun round from M60/M60A1 tank.	4.5 (1.5)	3.3 (1.5)	3.9 (1.6)	3.0 (1.4)	3.9 (1.3)	2.8 (1.6)	4.7 (1.5)	3.2 (1.4)	6.1 (1.4)	5.7 (1.5)	3.3 (1.4)
7. Throw misfired round out of turret in combat situation.	4.8 (1.8)	3.5 (1.7)	4.2 (1.8)	3.1 (1.6)	4.7 (1.4)	3.8 (1.8)	4.3 (1.7)	3.6 (1.8)	5.9 (1.6)	5.5 (1.7)	2.9 (1.5)
8. Disassemble/assemble M60/M60A1 tank breech mechanism.	4.0 (1.8)	2.7 (1.4)	3.4 (1.7)	2.4 (1.2)	3.0 (1.3)	2.6 (1.7)	3.1 (1.1)	2.9 (1.6)	4.8 (1.9)	4.8 (1.6)	4.4 (1.3)
9. Loosen bolts and nuts in order to remove armored/track vehicle engines.	4.4 (1.4)	3.1 (1.6)	4.1 (1.8)	3.0 (1.5)	3.9 (1.8)	2.8 (1.7)	3.8 (1.9)	3.6 (1.6)	4.0 (1.7)	4.4 (1.6)	2.9 (1.8)
10. Remove armored/track vehicle tracks.	6.0 (1.1)	4.3 (1.4)	5.5 (1.2)	4.3 (1.5)	4.4 (1.6)	3.8 (1.6)	4.9 (1.4)	4.8 (1.5)	5.1 (1.7)	4.8 (1.4)	3.6 (1.4)
11. Carry new track to vehicle (30 lb. blocks of 5 shoes).	6.7 (1.6)	5.8 (1.4)	6.5 (1.8)	5.8 (1.3)	5.7 (1.6)	5.4 (1.7)	6.2 (1.0)	5.8 (1.3)	6.3 (1.1)	4.2 (1.6)	2.4 (1.7)
12. Tighten track with "track jack" and set pins.	5.0 (1.0)	3.4 (1.7)	4.7 (1.4)	3.3 (1.6)	4.0 (1.4)	3.3 (1.8)	4.4 (1.6)	4.0 (1.4)	4.5 (1.6)	4.3 (1.8)	2.8 (1.3)
13. Tighten nuts on track with wrench.	4.6 (1.6)	3.2 (2.0)	4.6 (1.6)	3.1 (1.5)	4.0 (1.6)	3.3 (2.0)	4.0 (1.8)	4.0 (1.4)	4.4 (1.9)	4.2 (1.8)	2.6 (1.6)
14. Load/unload armored/track vehicle according to loading plan to include personal gear, sockets, wrenches, pioneer tools, radio, machine guns, ramming staff, gunner roll, camouflage nets, tents and stoves.	4.4 (1.3)	4.2 (1.5)	4.6 (1.6)	3.8 (1.8)	4.3 (1.5)	4.0 (1.9)	4.9 (1.3)	4.3 (1.6)	3.9 (1.7)	4.2 (1.9)	3.3 (1.7)
15. Mount armored/track vehicle from rear sprocket when on range.	3.2 (1.5)	3.3 (1.3)	3.0 (1.6)	2.6 (1.5)	3.1 (1.3)	3.2 (1.6)	3.0 (1.5)	2.3 (1.2)	3.7 (1.2)	4.2 (2.0)	1.8 (1.3)
16. Mount armored/track vehicles from right front when not on range.	3.1 (1.5)	3.4 (1.4)	3.0 (1.6)	2.6 (1.5)	3.0 (1.2)	3.2 (1.7)	2.8 (1.5)	2.3 (1.2)	3.4 (1.6)	4.3 (2.1)	1.8 (1.3)

CREWMAN 19E (Cont.)

	USSS	LBSS	UBOS	LBOS	SBOS	LSBS	TS	S	W	LS	B	S	Z
17. Escape from burning armored/track vehicle.	4.1 (1.7)	4.0 (1.6)	4.2 (1.7)	3.8 (1.8)	4.6 (1.8)	4.3 (2.0)	3.8 (1.7)	3.5 (2.0)	4.1 (1.7)	6.1 (1.6)	6.3 (1.3)	2.6 (1.5)	3.4 (2.4)
18. Pull unconscious crew member out of burning armored/track vehicle.	5.8 (1.4)	5.3 (1.5)	5.5 (1.4)	4.6 (1.8)	5.2 (1.8)	4.8 (1.7)	4.9 (1.6)	4.2 (2.1)	5.1 (1.7)	6.2 (1.3)	6.3 (1.3)	3.5 (1.6)	5.1 (2.0)
19. Escape from overturned armored/track vehicle.	5.1 (1.9)	5.6 (1.6)	4.6 (1.3)	4.2 (1.8)	4.7 (1.8)	4.2 (1.8)	4.3 (1.6)	3.8 (1.9)	4.4 (1.7)	6.0 (1.5)	6.1 (1.6)	3.1 (1.8)	3.4 (2.5)
20. Engage ammunition selector lever.	1.9 (1.3)	1.7 (1.4)	2.0 (1.4)	1.3 (.7)	2.4 (1.9)	1.7 (1.3)	1.4 (.7)	1.4 (.8)	4.5 (.7)	4.2 (2.2)	5.5 (2.2)	2.4 (1.5)	1.5 (1.2)
21. Open/close hatches (drivers, loaders, commanders).	2.8 (1.5)	2.3 (1.2)	3.0 (1.7)	2.0 (1.2)	3.3 (1.8)	2.1 (1.5)	2.6 (1.5)	2.0 (1.0)	2.7 (1.1)	3.8 (1.9)	4.3 (1.9)	1.6 (1.4)	1.6 (1.2)
Basic Combat/Tactical Operations													
22. Administer mouth to mouth resuscitation for 45 minutes.	3.3 (2.0)	2.3 (1.7)	3.0 (1.8)	1.5 (.9)	2.9 (2.1)	2.6 (2.1)	2.9 (2.1)	3.9 (2.0)	3.5 (1.7)	5.8 (2.1)	6.4 (1.3)	4.0 (1.5)	2.8 (2.3)
23. Perform external heart massage.	3.4 (1.6)	2.0 (1.2)	3.5 (1.9)	1.5 (.9)	3.4 (2.1)	2.6 (2.0)	2.9 (1.7)	3.7 (2.0)	3.5 (1.6)	5.8 (2.1)	6.4 (1.3)	4.1 (1.5)	2.7 (2.2)
24. Position casualties on litters during medical evacuation.	3.9 (1.5)	2.9 (1.3)	3.3 (1.7)	2.6 (1.4)	3.5 (1.9)	2.7 (1.5)	2.9 (1.5)	2.5 (1.4)	3.2 (1.5)	4.4 (2.0)	5.0 (1.6)	3.0 (1.6)	4.1 (2.4)
25. Carry casualties on litters using two-man technique during medical evacuation.	4.6 (1.6)	4.3 (1.7)	4.0 (1.9)	3.7 (1.7)	3.7 (2.0)	3.5 (1.6)	3.7 (1.5)	4.2 (1.6)	4.0 (1.5)	4.5 (1.7)	5.2 (1.6)	2.9 (1.8)	5.3 (2.3)
26. Carry casualties on litters using one-man pull during medical evacuation.	5.4 (1.5)	5.1 (1.7)	4.6 (1.8)	4.6 (1.7)	4.3 (2.2)	4.3 (1.7)	4.5 (1.6)	4.7 (1.6)	4.5 (1.5)	4.8 (1.7)	5.3 (1.7)	3.0 (1.8)	3.1 (2.3)
27. Move as a member of a fire team.	3.6 (1.6)	4.1 (1.9)	3.1 (1.5)	3.7 (1.7)	3.2 (1.9)	3.9 (1.9)	2.9 (1.5)	3.9 (2.0)	3.7 (1.5)	4.7 (1.9)	5.3 (1.8)	4.0 (1.7)	4.6 (2.5)
28. Move over, through and around barbed wire obstacles.	4.0 (1.8)	4.0 (1.6)	3.3 (1.4)	3.9 (1.7)	3.2 (2.0)	3.8 (1.8)	3.2 (1.5)	3.9 (1.8)	3.8 (1.7)	4.6 (1.7)	4.9 (1.7)	3.3 (1.4)	3.0 (2.1)
29. Construct individual defensive position.	4.6 (1.4)	4.1 (1.5)	3.9 (1.5)	3.6 (1.6)	3.3 (1.6)	3.1 (1.4)	3.6 (1.4)	4.0 (1.5)	3.7 (1.8)	4.7 (1.7)	4.9 (1.6)	3.7 (1.6)	4.0 (2.6)
30. Camouflage equipment using nets and poles.	4.6 (1.4)	3.5 (1.1)	3.4 (1.4)	3.0 (1.4)	3.1 (1.5)	3.0 (1.4)	3.2 (1.5)	3.4 (1.3)	3.4 (1.6)	4.6 (1.9)	4.8 (1.5)	3.5 (1.4)	5.7 (1.6)
31. Perform operator maintenance on M16A1 rifle, magazine, and ammunition.	2.6 (1.7)	1.7 (.7)	2.3 (1.1)	1.8 (1.7)	2.1 (1.5)	1.9 (1.2)	1.6 (.8)	1.9 (.9)	1.9 (.8)	4.1 (2.3)	4.5 (2.0)	3.3 (1.6)	2.0 (2.0)
32. Engage enemy targets with M16A1 rifle.	2.5 (1.5)	1.9 (.8)	2.3 (1.1)	1.7 (1.2)	2.4 (1.5)	1.6 (.7)	1.6 (.7)	1.8 (.8)	1.8 (.8)	4.5 (2.3)	5.4 (2.1)	3.0 (1.6)	1.6 (1.6)

CREWMAN 19E (Cont.)

	UBSS	LBSS	UBOS	LBOS	UBES	LBES	TS	S	W	413	BT	9	2
33. Engage enemy targets with hand grenades.	3.2 (1.7)	2.1 (1.1)	3.1 (1.5)	2.0 (1.1)	3.2 (1.6)	2.1 (1.0)	1.9 (1.0)	2.0 (1.9)	2.5 (1.1)	4.5 (2.1)	5.4 (2.0)	2.9 (1.6)	1.8 (1.6)
34. Load/unload ammunition and supplies from vehicles.	5.1 (1.2)	4.4 (1.4)	4.7 (1.5)	4.3 (1.6)	4.4 (1.5)	3.8 (1.7)	4.7 (1.7)	4.3 (2.0)	4.6 (1.6)	4.4 (2.0)	4.3 (2.1)	2.4 (1.6)	5.5 (1.9)
35. Change tires to maintain the unit's vehicles.	5.0 (1.6)	4.1 (1.6)	4.7 (1.7)	3.5 (1.6)	4.2 (1.4)	3.6 (1.7)	4.3 (1.4)	4.0 (1.7)	4.1 (1.4)	4.1 (1.7)	3.8 (2.0)	2.5 (1.4)	3.0 (2.1)
Average across tasks	4.3 (1.0)	3.6 (1.9)	4.0 (1.1)	3.4 (1.1)	3.8 (1.1)	3.3 (1.1)	3.7 (1.0)	3.7 (1.0)					
Overall job	6.2 (.6)	5.7 (1.0)	6.2 (.8)	4.8 (.8)	5.8 (.9)	4.8 (.9)	5.0 (1.0)	5.0 (1.1)	5.9 (1.1)	6.2 (.9)	5.5 (1.5)	4.4 (.8)	5.9 (1.2)

Descriptive Statistics for Military Police (95B)

	USSS	LSSS	USSB	SDBN	LDOS	USBR	LSBS	T2	S5	M3	AJ3	D0	G7	ZL
1. Run through wooded area for approximately 1.6 kilometers to apprehend a law violator.	2.0 (1.4)	5.9 (1.7)	4.5 (1.3)	5.7 (1.3)	3.8 (1.1)	5.5 (1.6)	4.3 (1.6)	5.2 (1.1)	5.7 (1.1)	4.8 (1.6)	6.2 (1.3)	3.5 (1.2)	3.9 (2.5)	
2. Climb over a 6 ft. wall in pursuit of a law violator.	5.3 (1.4)	4.7 (1.2)	5.3 (1.6)	4.8 (1.3)	4.9 (1.1)	5.1 (1.1)	4.3 (1.5)	4.5 (1.3)	5.3 (1.1)	4.8 (1.7)	6.2 (1.1)	3.2 (1.9)	3.8 (2.4)	
3. Restrain a law violator using night stick and handcuffs.	4.6 (1.4)	3.4 (1.3)	4.4 (1.0)	3.7 (1.2)	4.4 (1.0)	3.7 (1.4)	3.8 (1.5)	3.7 (1.1)	4.4 (1.1)	5.4 (1.2)	6.0 (1.3)	5.6 (1.3)	5.7 (1.5)	
4. Control an uncooperative subject in a bar using hand to hand combat.	5.8 (1.0)	4.4 (1.2)	5.1 (1.1)	4.3 (1.3)	5.1 (1.1)	4.5 (1.3)	4.5 (1.6)	4.3 (1.1)	5.4 (1.0)	5.7 (1.1)	6.2 (1.0)	4.9 (1.1)	5.6 (1.9)	
5. Control an uncooperative subject using a night stick.	4.8 (1.2)	3.7 (1.2)	5.6 (1.4)	3.4 (1.3)	4.4 (1.3)	3.6 (1.1)	3.8 (1.4)	3.7 (.9)	4.5 (1.2)	5.4 (1.3)	6.1 (1.1)	4.7 (1.1)	5.3 (1.8)	
6. Pull two men apart in an attempt to break up a fight (ABRAY).	5.5 (1.2)	4.4 (1.2)	5.2 (1.1)	4.3 (1.4)	5.3 (1.4)	4.6 (1.3)	4.5 (1.6)	4.4 (1.2)	5.4 (1.2)	5.6 (1.2)	6.0 (1.2)	4.1 (1.6)	5.6 (1.7)	
7. Assist in evacuating injured/deceased personnel at scene of a traffic accident.	5.0 (1.2)	4.6 (1.2)	4.7 (1.4)	4.5 (1.2)	4.6 (1.1)	4.2 (1.1)	4.6 (1.2)	4.0 (1.1)	4.7 (1.4)	5.7 (1.5)	6.3 (1.0)	4.1 (1.4)	5.8 (1.8)	
8. Conduct joint civil/military CD patrols in full gear.	3.6 (1.3)	4.2 (1.1)	3.8 (1.0)	3.8 (1.4)	3.1 (1.2)	2.8 (1.3)	3.2 (1.4)	3.3 (1.3)	3.3 (1.3)	4.0 (1.5)	4.1 (1.4)	3.7 (1.5)	5.0 (2.4)	
9. Climb fire escape of five story building to roof for observation of CD operation.	4.5 (1.5)	5.2 (1.3)	4.5 (1.5)	5.0 (1.4)	4.1 (1.5)	4.6 (1.6)	3.8 (1.4)	4.0 (1.3)	5.0 (1.6)	4.3 (1.4)	4.7 (1.6)	2.9 (1.6)	3.6 (2.3)	
10. Climb a tree to spot violators participating in a civil disturbance.	4.5 (1.5)	4.7 (1.5)	4.3 (1.4)	4.4 (1.5)	4.2 (1.5)	3.9 (1.5)	3.7 (1.4)	3.6 (1.3)	4.1 (1.4)	4.2 (1.4)	4.7 (1.6)	3.0 (1.6)	3.4 (2.3)	
11. Control crowd with unit in riot control formation using riot baton.	4.6 (1.4)	4.5 (1.4)	4.5 (1.4)	4.1 (1.5)	3.8 (1.4)	3.7 (1.2)	3.6 (1.4)	3.6 (1.3)	4.1 (1.1)	5.3 (1.3)	5.7 (1.2)	4.6 (.9)	5.7 (2.3)	
12. Control crowd with riot control agent munitions.	3.3 (1.2)	3.1 (1.4)	3.4 (1.4)	3.1 (1.6)	3.2 (1.2)	2.7 (1.1)	3.0 (1.1)	2.8 (1.3)	3.2 (1.3)	5.1 (1.5)	5.4 (1.3)	4.4 (1.2)	5.4 (2.4)	
13. Control crowd with high pressure water.	4.6 (1.2)	4.1 (1.2)	4.6 (1.2)	4.3 (1.3)	3.9 (1.1)	3.5 (1.2)	3.5 (1.2)	3.7 (1.3)	3.7 (.9)	5.1 (1.3)	5.4 (1.3)	3.8 (1.2)	5.4 (2.5)	
14. Apprehend/detain violators during CD operations using riot baton.	4.7 (1.2)	4.2 (1.0)	4.4 (1.3)	4.0 (1.3)	4.3 (1.4)	3.4 (1.3)	3.7 (1.3)	3.8 (1.2)	4.1 (1.4)	5.0 (1.4)	5.5 (1.3)	4.4 (1.2)	5.3 (2.3)	
15. Apprehend/detain violators during CD operations using hand to hand combat.	5.7 (1.5)	4.8 (1.4)	5.2 (1.1)	4.6 (1.4)	5.3 (1.2)	4.7 (1.3)	4.7 (1.6)	4.6 (1.3)	5.0 (1.4)	5.6 (1.3)	6.0 (1.2)	4.6 (1.4)	5.3 (2.3)	
Basic Combat/Tactical Operations														
16. Administer mouth to mouth resuscitation for 45 minutes.	4.4 (1.6)	2.4 (1.1)	4.2 (1.7)	2.7 (1.3)	3.1 (1.4)	2.7 (1.4)	3.3 (1.6)	4.4 (1.5)	4.5 (1.3)	6.3 (1.2)	6.8 (.6)	4.6 (1.4)	3.9 (2.7)	

	UBSS	LBSS	UBOS	LBOS	UBSS	LBSS	UBOS	LBOS	TS	S	W	AP	AS	PL
17. Perform external heart massage.	4.3 (1.3)	2.4 (1.1)	4.4 (1.2)	2.5 (1.3)	3.6 (1.4)	2.4 (1.1)	3.3 (1.5)	4.0 (1.6)	4.3 (1.6)	6.3 (1.2)	6.8 (1.3)	5.0 (1.4)	5.0 (1.4)	5.0 (1.4)
18. Position casualties on litters during medical evacuation.	4.5 (1.3)	3.8 (1.4)	4.7 (1.0)	4.0 (1.3)	4.0 (1.2)	3.5 (1.7)	3.8 (1.2)	3.8 (1.4)	3.8 (1.4)	5.0 (1.4)	5.5 (1.3)	5.5 (1.3)	5.5 (1.3)	5.5 (1.3)
19. Carry casualties on litters using two-man technique during medical evacuation.	5.1 (1.1)	4.8 (1.3)	5.0 (1.1)	4.8 (1.2)	4.3 (1.3)	3.9 (1.4)	4.1 (1.2)	4.3 (1.2)	4.6 (1.3)	5.3 (1.4)	5.4 (1.4)	3.0 (1.3)	3.0 (1.3)	3.0 (1.3)
20. Carry casualties on litters using one-man pull during medical evacuation.	5.7 (1.1)	5.4 (1.3)	5.5 (1.1)	5.3 (1.5)	5.0 (1.3)	4.7 (1.8)	4.9 (1.5)	4.9 (1.5)	5.1 (1.4)	5.4 (1.4)	5.5 (1.4)	3.2 (1.2)	3.2 (1.2)	3.0 (1.2)
21. Move as a member of a fire team.	3.9 (1.4)	4.6 (1.6)	4.0 (1.3)	4.7 (1.3)	3.5 (1.5)	4.8 (1.4)	3.4 (1.1)	4.1 (1.2)	4.0 (1.4)	5.8 (1.2)	6.0 (1.4)	4.0 (1.4)	4.0 (1.4)	5.7 (2.4)
22. Move over, through and around barbed wire obstacles.	4.3 (1.3)	5.0 (1.3)	4.4 (1.3)	5.0 (1.1)	4.0 (1.6)	4.3 (1.6)	3.8 (1.4)	4.1 (1.4)	4.1 (1.5)	5.4 (1.4)	5.7 (1.4)	3.9 (1.6)	3.9 (1.6)	4.4 (2.3)
23. Construct individual defensive position.	4.9 (1.3)	4.2 (.9)	4.9 (1.1)	3.8 (1.1)	3.7 (1.3)	3.5 (1.4)	3.7 (1.4)	3.9 (1.6)	4.0 (1.3)	5.8 (1.3)	5.7 (1.1)	3.8 (1.5)	3.8 (1.5)	3.9 (2.6)
24. Camouflage equipment using nets and poles.	4.3 (1.4)	3.6 (1.2)	3.9 (1.1)	3.5 (1.2)	3.6 (1.2)	3.4 (1.2)	3.2 (1.1)	3.1 (1.3)	3.6 (1.2)	5.5 (1.3)	5.2 (1.3)	3.5 (1.5)	3.5 (1.5)	3.3 (2.1)
25. Perform operator maintenance on M16A1 rifle, magazine, and ammunition.	2.6 (1.2)	2.0 (1.1)	2.6 (1.2)	2.2 (1.2)	2.5 (1.3)	2.1 (1.1)	2.4 (1.2)	2.0 (1.1)	2.7 (1.7)	6.1 (1.0)	5.4 (1.3)	3.3 (1.5)	3.3 (1.5)	3.4 (2.6)
26. Engage enemy targets with M16A1 rifle.	2.7 (1.6)	2.0 (1.1)	2.6 (1.3)	2.3 (1.3)	2.6 (1.4)	2.4 (1.5)	2.1 (1.3)	2.1 (1.3)	2.8 (1.8)	6.1 (1.3)	6.1 (1.4)	3.4 (1.9)	3.4 (1.9)	3.6 (2.8)
27. Engage enemy targets with hand grenades.	3.8 (1.4)	2.4 (1.3)	3.3 (1.5)	2.6 (1.3)	3.5 (1.4)	2.5 (1.4)	2.8 (1.3)	2.5 (1.4)	3.1 (1.8)	6.1 (1.3)	6.0 (1.4)	3.4 (1.8)	3.4 (1.8)	3.8 (2.9)
28. Load/unload ammunition and supplies from vehicles.	5.6 (1.2)	4.7 (1.1)	5.1 (1.2)	5.0 (.8)	4.6 (1.5)	4.4 (1.2)	4.5 (1.2)	4.5 (1.2)	4.7 (1.3)	5.3 (1.3)	4.9 (1.4)	2.2 (1.7)	2.2 (1.7)	5.5 (2.2)
29. Change tires to maintain the unit's vehicles.	4.5 (1.2)	3.3 (1.5)	4.2 (1.5)	3.8 (1.4)	4.1 (1.7)	3.2 (1.4)	3.7 (1.5)	3.8 (1.6)	3.9 (1.7)	4.9 (1.5)	4.6 (1.5)	2.1 (1.5)	2.1 (1.5)	3.3 (2.5)
Average across tasks	4.5 (.8)	4.1 (.8)	4.4 (.9)	4.4 (.8)	4.1 (.8)	3.8 (.8)	3.7 (.7)	3.8 (.7)	4.6 (.8)	6.1 (.6)	5.9 (1.1)	5.8 (1.2)	5.8 (1.2)	6.4 (.9)
Overall jobs	4.4 (1.2)	4.1 (1.3)	4.2 (1.1)	4.6 (.9)	5.2 (1.2)	5.2 (1.4)	4.6 (.9)	4.8 (.9)	4.6 (1.2)	6.1 (1.0)	5.9 (1.1)	5.8 (1.2)	5.8 (1.2)	6.4 (.9)

APPENDIX H

Correlations Across the 13 Scales for Total Sample (4 - MOSSs)

	US	1	LS	2	UB	3	LD	4	UE	5	LE	6	TS	7	STAM	8	EF	9	CIP	10	BT	11	LD	12	TU	13
US	1.0000																									
1	.9872	1.0000																								
LS	.9872	.9872	1.0000																							
2	.9872	.9872	.9872	1.0000																						
UB	.9872	.9872	.9872	.9872	1.0000																					
3	.9872	.9872	.9872	.9872	.9872	1.0000																				
LD	.9872	.9872	.9872	.9872	.9872	.9872	1.0000																			
4	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000																		
UE	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000																	
5	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000																
LE	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000															
6	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000														
TS	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000													
7	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000												
STAM	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000											
8	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000										
EF	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000									
9	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000								
CIP	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000							
10	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000						
BT	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000					
LD	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000				
12	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000			
TU	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000		
13	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	.9872	1.0000	